

SUPPLEMENT.

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LONDON, SATURDAY, NOVEMBER 22, 1879.

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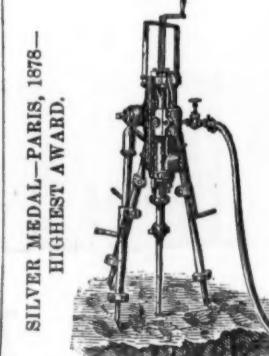
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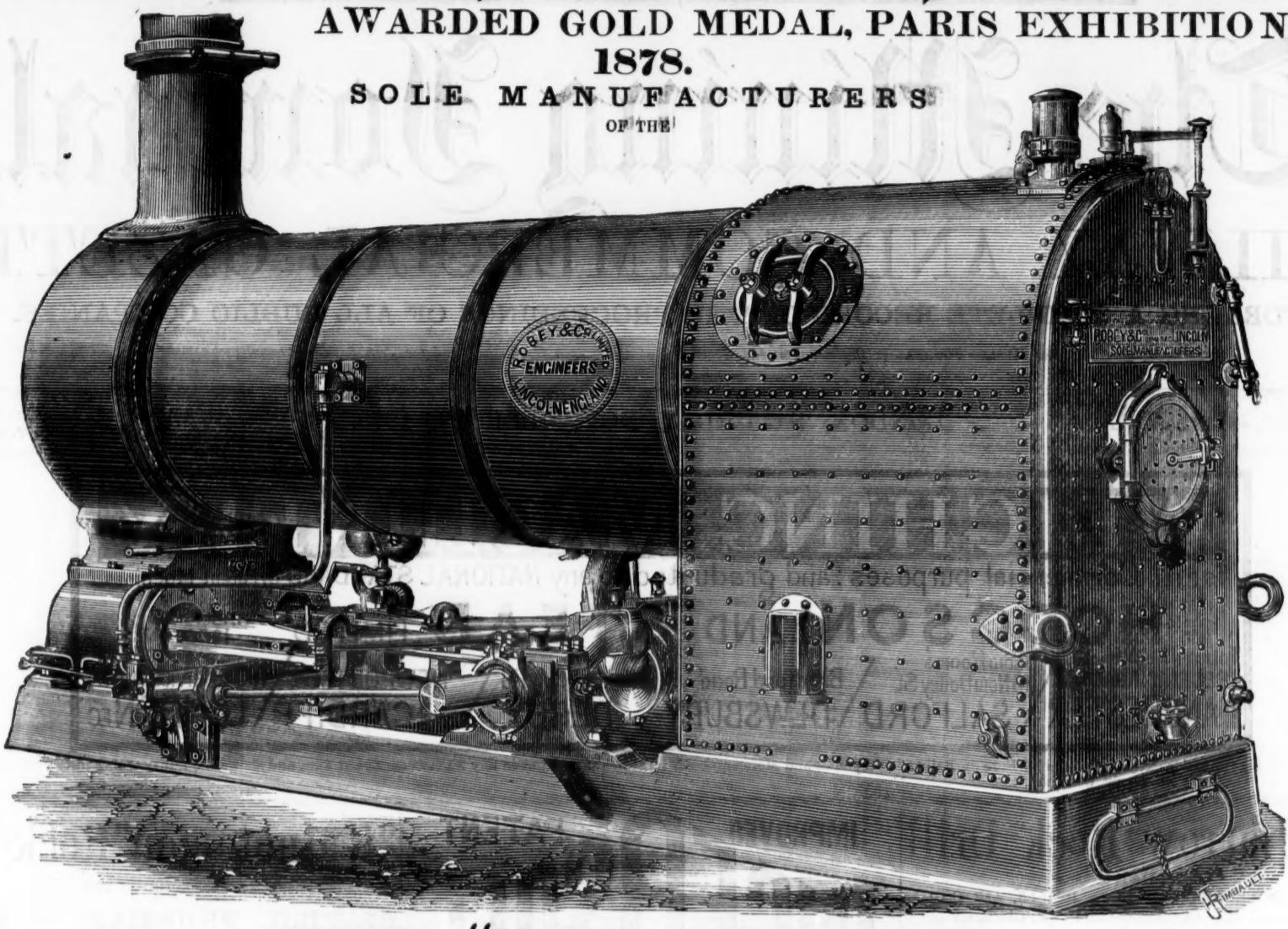
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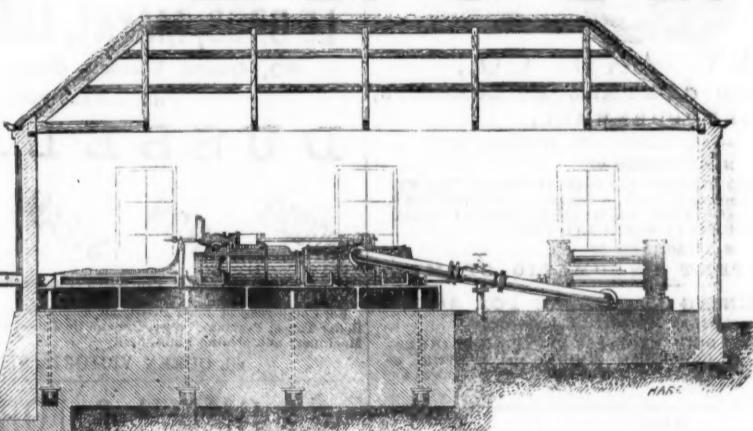
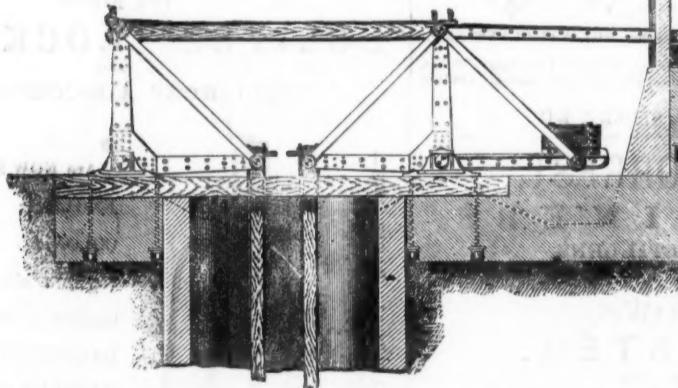
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Original Correspondence.

THE IRON TRADE IN AMERICA.

SIR.—I observe in the Journal for Nov. 8 an article on iron ore exports into the United States, noticing the fact that one of the Pennsylvania establishments is collecting ores from the old world. Considering the vast and hitherto unused masses of the finest varieties of hematite and magnetic ore in Virginia and the country to the south, on the eastern side of the Appalachian mountain chain, this selection must seem extraordinary, and hardly likely to be continued. Nothing could be easier than to bring the native deposits into use, as they are close to existing lines of railway, but perhaps it may not be to the interest of the Philadelphia ironmasters to call attention to a district which sooner or later will take the place of their State on even more favourable times in the American iron trade.

Many years since I called attention to this great supply of mineral wealth, but in the year 1874, just at the commencement of the bad times, which have only lately shown symptoms of recovery, I had an opportunity while in the United States of examining and reporting on several properties, which might then have been purchased for mere nominal sums. They are probably still to be obtained. Nothing was done with them, as from that time to this there has been no movement in the iron trade, but nothing can be more unreasonable than the idea that these properties so near home should be neglected, while similar, and perhaps inferior, ones are sought for at a distance of thousands of miles.

No doubt the dread that is felt with regard to the continuance of protection in iron will check investments even in the most promising properties if the effect is to be the creation of an industry in a district which may almost be regarded as new, but the presence of coal of the best kind in very convenient deposits, of dimensions practically unlimited, in West Virginia, and of iron ores of the best quality in equal abundance a little further east, with a railway (the Chesapeake and Ohio) to connect them, can only end in transferring much of the iron manufacture to the place where the works can be most economically carried on. In this respect Virginia will in time take the place of all foreign sites for the supply and reduction of iron ores. Iron-stone will not long be imported into America, although, thanks to the feeling in favour of protection still predominant, the English maker may, if the labour question does not interfere, help for some time to supply the demand now only commencing.

Princes-street, Westminster, Nov. 15. D. T. ANSTED,
Consulting Mining Engineer.

CANADIAN MINING NOTES.

SIR.—With the rise in prices of metals of all descriptions which has taken place in England it is more than probable those who are acquainted with mines and minerals in the Old Country will turn their attention to Canada and the other colonies. Perhaps Canada offers more inducements than any—partly on account of our protective tariff, partly on account of its nearness compared with Australia and India. Add to this the building of a long line of railroad, like the Canada Pacific, which will require a great quantity of steel rails, and the settlement of such an immense country as the North West. The great trouble we find in Canada is to bring our mines before the English public. If there were a man or firm known in Canada, and settled in London, that would undertake the promotion and establishment of companies to work the mines a great many valuable mines could be started. I know of several myself. One argeniferous galena that assays \$50 a ton in silver and 500 lbs. in lead to a ton of 2000 lbs. An iron mine, of which the following is a copy of the assay:

Protode of iron	26.18
Sesquioxide of iron	58.76
Oxide of manganese	27
Titanic acid	Faint traces
Phosphoric acid	—
Sulphuric acid	Faint traces
Siliceous and rock matter	14.68 = 99.89
Metallic iron.....	61.

This mine is near Lake Superior, about $\frac{1}{2}$ mile from the shore, and a vessel of 500 tons could load and go to Liverpool, although it would probably be better to tranship at Montreal and send it by large steamer. But for a manufactory of rails for the Canada Pacific Railway no better situation or deposit could be found. A company formed to make Bessemer rails at that point would have all its material at hand and its demand for rails in the Canada Pacific Railway. No better opportunity for the establishment of a branch Bessemer rail factory could be wished.

Then there are a great number of lead mines which, when opened, would no doubt produce large quantities of metal. In the eastern townships in the province of Quebec a splendid asbestos mine has been discovered, and the ore is sent to New York and sold for \$100, or 20/-, a ton. I do not know what the price of asbestos is in England, but if the demand is great we have the material here.

Probably the best speculation that could be entered into by men who have money, and are engaged in mining, is to buy 4000 or 5000 acres of land in the county of Frontenac. This could be obtained in some of the townships for \$1 an acre from the Government of Ontario. The number of good mines that could be found would make a fortune for the holders, while the chance of any losses is a minimum, for the land itself would never go below that 4s. an acre, and it would make good sheep pasture.

The mining excitement in New York has raged and is still "booming." All shares both in Canada and the United States have gone up, but the rise in the United States has been equal to the rise in England.

Canadians find themselves, as compared with the United States, in about the same position that the colonies which compose the United States found themselves before the revolution of 1776 with regard to England—fighting against ignorance. It is wonderful what an amount of ignorance some of the New York papers display with regard to Canada, and papers, too, that ought to know better. The New York Sun, for instance, has made such foolish statements with regard to the Canadian Pacific Railway that the Globe has taken the trouble to enlighten their darkness and give them the geographical facts, as follows:—

The Sun speaks from the depths of absolute ignorance concerning the Canadian Pacific Railway. Comparing it with the American trans-continental route the Canadian line has the advantage in every respect. Instead of passing through a desert many hundred miles wide, as the American road does, it will traverse a region of unexampled fertility between Lake Superior and the Rocky Mountains, a tract estimated by the best authorities to contain 160,000,000 acres of agricultural land. Between Lake Nipissing and Winnipeg the snowfall is about the same as in the eastern provinces; between Winnipeg and the Rocky Mountains the fall is lighter than in Ontario, and only for a few miles on their western slope will snow sheds be required. The serious difficulties offered by snow to the working of the American line will be practically non-existent on the Canadian one. Our road, too, will pass through a country possessing a far better climate than that on which our neighbour's line has been constructed. The cold is less intense in the lower passes of the Rockies in the Dominion than in the high levels by which the American line reaches the Pacific. . . . For through traffic, too, the Canadian trans-continental line will have important advantages, as this table of distances will show:—

Yokohama to San Francisco	Miles 4470
Yokohama to Burrard Inlet	4374
San Francisco to New York	3390
Burrard Inlet to New York	3241
Burrard Inlet to Montreal	2862
Burrard Inlet to Quebec	2880
New York to Liverpool	3040
Montreal to Liverpool	2900
Quebec to Liverpool	2845

The Canadian line will bring Yokohama 100 miles nearer to Liverpool than the American, and will offer to New York a route via Montreal to Japan 254 miles shorter than it possesses at present. In the future Canada will command the railway traffic between Asia and Europe by her trans-continental road, and will in the meantime open up her own immense territory by its construction. The venture is as much a warrantable one as any national undertaking well can be.

I am sure that this will be interesting and instructive. But there is another feature in the country, and that is that Nelson river, by means of some expenditure, may be rendered navigable, and then the cereals of the North-West can go down the river to Hudson Bay and be shipped direct to Liverpool. If the Liverpool Chamber of Commerce were to appoint a committee to take some steps they

might find a new field for their shipping which would discount New York in cheapness and speed for moving the great grain crops of the North-West.

BOURNONITE.

INTERNATIONAL EXHIBITION, NEW SOUTH WALES, 1879.

SIR.—Although an "Exhibition" is not, strictly speaking, cognate matter for your columns, still as this is the first one in Australia a few words about it may not be considered altogether out of place under the circumstances. The building itself is near to Government House, commanding a splendid panoramic view of gardens, villas, and harbour, has a floor area of about $7\frac{1}{2}$ acres, and about 340,000 square feet for exhibits. The total cost to us is about 250,000/., and what between the takings and the value of the reversion of the building to the State for public purposes there is not likely to be much loss eventually. It was opened on Sept. 17 by his excellency Lord Augustus Loftus (our Governor) and the Governors of three of the neighbouring colonies, and many of their leading men also honoured us by their presence, as also representatives, commissioners, and consuls from all the European empires and kingdoms, and from the United States, besides Canada and other British colonies, and most of the South American Republics. From first to last the opening ceremony was a great success, and although quite half the exhibits were not in order I am assured by such of my fellow-commissioners as were at the opening of the Paris Exhibition that ours was quite as forward as that was. A very beautiful cantata—words and music both "colonial"—sung by 500 children opened the proceedings, and during the day, from noon till 6 P.M., over 16,000 visitors attended.

The largest exhibitor is England; little Belgium sends 600 tons and Germany, Austro-Hungary, and France very large shipments; Holland, Switzerland, Italy, all our Australian colonies, Fiji, New Caledonia, the Straits Settlements, &c., all make a good show, and as regards the variety, value, and beauty of the exhibits, I am assured by visitors who have seen the Old World Exhibitions that ours is fully equal in every respect excepting, of course, space and quantity. To give room in the main building all the pictures (between 600 and 700) are to be placed in a special pavilion, now being erected; and also all the machinery in sheds some little distance away, and as this item may probably be of more interest to you than others, I append the list of spaces for the various countries: Sections A and B—Section A, available space 48,000 superficial feet: America 4000, France 2000, Germany 2000, South Australia 2000, Belgium 248, New South Wales 2490, Canada 240, Great Britain 35,022: total superficial feet allowed, 48,000.—Section B: Victoria 8000, America 4480, Germany 4000, New South Wales 2248, Great Britain 21,752, Canada 5520: total, 45,900; unallotted 2100 = 48,000 superficial feet. The total quantity of space allotted in London on floor, 55,642 ft.; total granted here, 56,774; wall space allotted, 276. Summary of space granted both halls, total space 96,000 superficial feet: Victoria 8000, America 8480, France 2000, Germany 6000, South Australia 2000, Belgium 248, New South Wales 4738, Great Britain 56,774, Canada 5760: total space allotted, 94,000 superficial feet. In addition to the area of the two halls specified above, Messrs. Drysdale and Roberts have erected a building providing an area on floor of 5000 ft., all of which is fully occupied by machinery exhibited by that firm. The exhibits in the open air cover an estimated area of 5000 ft.

Belgium comes out very strong in all kinds of iron and steel ware, and in many other manufactures which we colonials looked on as British specialties; we see other European nations closely rivalling the Mother Country.

It will be quite the middle of October before everything is finally ready, as there are over 1000 packages yet to arrive, and the Exhibition will be open for six months, so as to give all our country cousins the fullest opportunity of visiting it. If it only ends as well as it has begun New South Wales will have no reason to be ashamed of her first "International Exhibition." Our executive commissioner, Mr. P. A. Jennings, C.M.G., has had an arduous time of it for the last four months, and both he and the indefatigable secretary, Mr. Augustus Morris (who was our executive commissioner at Philadelphia), have literally been working night and day lately to try and ensure success, and as our "commission" generally was a good working one, and they both had previous practical knowledge, and having so achieved it—"Palmam qui meruit ferat."

Her Majesty and H.R.H. the Prince of Wales have won golden opinions here by their thoughtful kindness in sending out a collection of splendid pictures on loan, and if either, or both, had been present when the statue of Her Majesty was uncovered, and heard the hearty cheers which greeted it, they would have no doubt as to the loyalty of this—the greatest and richest of Australian colonies.

Sydney, Sept. 19. R. D. ADAMS.

PS.—Over 30,000 visitors on the first shilling day.

IMMENSE INCREASE OF REVENUE TO RUSSIA—HYPER REHABILITATION OF IMPERIAL FINANCES.

SIR.—Palmer's Index to the Times of January, 1873, points to a lengthened contribution from my pen on "Russia in Asia," wherein is promulgated the construction and working of a gravitation (or undulating) trajectory from an always open North Sea port to the seaboard on the Gulf of Pe-Chili, China, embracing connection with Calcutta and Bombay. Such will pour into the Imperial Exchequer (the estimated income of which for 1879 is 62,896,000/ sterling) the entirety of the immense amounts disbursed for the transport of the China and India import and export traffic with the United Kingdom, amounting respectively by the latest Board of Trade Returns to 21,770,301/ and 52,129,640/ annually. This line will simultaneously open out the trade of Siberia and the Ural district in wood, iron, grain, spirits, tallow, &c., practically, with the exception of tallow, shut out of the European markets. The Standard of the 13th inst. has a lengthened apologetic article on the "Future of Siberia," via the Obi, &c., and seaborne to this country. As I treated on this subject in the Timber Trades Journal on Oct. 11 last, my views, in strict conformity with what Czar Peter the Great proposed to his subjects, are fully confirmed by the Standard, which states—"The sanguine dreams by certain parties of sailing from the ports of Europe to those of Siberia, and trading therewith, have received a rude shock within the last two months, for of the eight steamers which have attempted the Kara Sea only two have succeeded in doing so." It is perfectly impracticable to carry on an import or export trade to and from Siberia by the proposed route, and by analogy a running blockade system will never receive the support of the legitimate trader who has anything to lose. Adventurers trafficking upon the capital of others will find it at the best a hazardous and, in the aggregate, a losing game.

This new land route will throw into the hands of the Moscow and other manufacturers an incalculable advantage in the supply of India and China with their manufactures. An industrial and commercial defeat will cause more agitation in England than anything else of whatever description, as the installation of this route will displace the entirety of the immense fleet of steamers and sailing ships employed in the China and India trade. Not only will the cost of transport be incalculably reduced, but what is of the greatest importance, the time of transport will not be one-half of what is now consumed by the fastest steamers. Troops and warlike stores will not require from St. Petersburg to British India, with stoppages en route, more than a week, with the enjoyment of the most equable motion, and every comfort incidental to Russian railway transit.

Russia's exports last year to this country amounted to 17,803,852/, her imports from this country amounting to 9,458,729/. Her exports are open to a vast increase by the system now submitted to the serious consideration of the High Imperial Government. As the construction of the trajectory will be exclusively of wood, the virgin, and hitherto to commerce inaccessible, forests of Siberia will be rendered available, and the comparatively trifling amount of iron or steel, as well as the entirety of the material, will be of indigenous produce and manufacture. The large ocean steamers will be built in Siberia, engined by Russian mechanical firms, and with exclusively Russian crews. No recourse will be necessary to a foreign loan, as no State possesses such financial resources and facilities as Russia, by reason of her unrivalled system of autocratic government. Statesmen and the world at large are thoroughly and inadvertently at sea with regard to this point, and the financial prosecution of the Crimean

and recent Turkish wars affords matter for more serious reflection. Russia is capable of shutting herself up within her gigantic homogeneous limits, and it is perfectly absurd to think of this country staying her advance in Asia and China if she be so inclined to prosecute her task of civilisation. She has contracted large loans, eagerly subscribed to in this country and elsewhere, and strictly fulfilled all her engagements with the greatest regularity, and will continue to do so. Russia possesses within the precincts of her own vast empire the power of dispensing with foreign loans by availing herself of the now proposed and other undeveloped channels of revenue within her immediate reach. By the infusion of practical elements capable, through lengthened and diversified experience, of manipulating financially, technically, and commercially such matters, Russia will render herself more mighty than combined Europe.

Truly may it be said of one of the debutants, "C'est prodigieux tout ce que ne peuvent pas ceux qui peuvent tout." At last we have got a Baker to superintend the working up of the dough, which requires very great experience to manipulate properly. If the manutention partake of the listlessness of a lengthened past period, what will be the result? Nous verrons. Let the "chancelain" system of government in this country learn that Russia, with her flotilla of small craft endowed with immense speed, can by means of balloons with clockwork, taking advantage of a favourable wind, calculate with the greatest accuracy the descent of such weighted with dynamite, and thus carry destruction to our arsenals and maritime towns and shipping. It does not require to be nearer the land than 20 miles, which presents ample sea room. The smallest craft are sufficient. Thoroughly conversant with the various idioms, I have perused some of the leading railways abutting on the Metropolis.

As Russian consul during upwards of 25 years at the dual Tyne ports, whence a larger tonnage of cargo is shipped than from any port in the globe, as having been a householder at St. Petersburg, and travelled during many years in the empire, I feel a deep interest in straining every effort in my humble power to her advancement. The investment of 200,000 roubles towards preliminary expenses is promised in the event of his Imperial Majesty's Government approving of the undertaking. The undersigned demands not the slightest compensation, being merely kept free of outlay. A large model trajectory can be constructed in St. Petersburg, the working of which will prove the practicability of my system, which, with your indulgence, I shall technically more fully develop in my next. Having regularly read your Journal in St. Petersburg, which circulates without the least hindrance as a non-political paper, and is there highly prized, I am glad to avail myself of the privilege of ventilating this important subject in your widely disseminated hebdomadal.

Little Tower-street, Nov. 18. — WM. JOSEPH THOMPSON.

THE PANULCILLO COPPER COMPANY.

SIR.—While allowing that much may be said in favour of Panulcillo, I think the letters of a "Permanent Shareholder" might lead to exaggerated expectations, if not measured by the statements of some important facts and considerations.

Firstly, I readily admit that the company's mines never looked better as regards the reserves and improved methods of working. There can be no question either that the management and organisation (the result of a long and painful experience) are now as near perfection as possible, while the desire on all sides is to work the company exclusively in the interests of the shareholders. With the general revival, too, in trade we may look for an extension in the use of copper, with which extension we may fairly hope for a further and not unimportant advance in copper prices, which would, of course, benefit Panulcillo to the extent of about two-thirds, being about the amount of its own ores used in making regulus, except so far as this might be neutralised by increased wages, &c. Looking, then, at the position broadly, the prospects for the shareholders appear promising enough, but what I demur to is that the benefit accruing to them will be felt so immediately as "Permanent Shareholder" indicates. The rise which has so far occurred in copper will hardly meet the increased charges that must necessarily ensue to the company from the higher cost of carbonate ores, increased freights, &c. While the depreciation in the Chilean currency has further accentuated the apparent rise in Chile, and thereby led, I hear, to an unpleasant competition for outside ores of low quality, which, till lately, had been left entirely to Panulcillo. This is a very important point. Another is that ores bought when the price of bar copper was \$23 will have to be delivered as regulus when the price has fallen to \$18—the quotation by last cablegram. Then again when the six months' accounts come to be made up a serious deduction will have to be made in the sterling result for loss in exchange. Furthermore, as I presume, there was no stocktaking when the result of the first four months working was telegraphed, the results of those four months were simply approximative, and may be considerably modified by the operations of the last two months of the half-year, as well as from the causes I have just stated. Looking then at the question from all sides, I see no hopes of any such brilliant results as a "Permanent Shareholder" indicates. If this company can do something better than in the past 12 months, it is as much as one should hope, and if so the shareholders must defer any expectation of a full dividend until 1881. If my views are right, the shares are no doubt worth par (4/-), but anything paid beyond that figure should rest more on the hope of 1881 than of those for next year.

CAUTION.

THE FLAGSTAFF SILVER MINING COMPANY OF UTAH.

SIR.—I had hoped that my letter of last week would have been a sufficient refutation of the charge made against me by Mr. Ellis Pearson in respect to my knowledge of the terms of these extraordinary "proposals," but I find I am the subject of another letter, this one of a more astounding and venturesome nature than the one of last week. I must, therefore, apologise for again trespassing on your space. I should have thought that Mr. E. Pearson would have had more self-respect than to publish a document which has nothing whatever to do with the question at issue, and which was given to him under peculiar circumstances, and the way in which he seeks to apply it almost surpasses belief. The memorandum he quotes was not drawn up by me. He knows perfectly well that the whole of the paragraph which he says is in my handwriting was not only suggested but dictated, word for word, by himself, but for some reason best known to himself he seeks to disguise the truth.

Now, Sir, as Mr. E. Pearson has chosen to betray confidence, I will state why the memorandum was given, and for what purpose. Mr. Pearson had always represented that he controlled both the petitions—the smaller one as well as his own. These had been postponed from last February to Aug. 2, and it was deemed advisable to get them further postponed till November. For this purpose it was necessary to offer some inducement, and Mr. Pearson having so often impressed upon me that he was authorised by the holders of the properties to sell the same, and that he had received "proposals" from them, and crediting him with truth

solicitor were present in court. However, the Court refused to allow them to be heard. As Mr. Pearson had broken the compact I asked him to return the memorandum, which he declined to do. I leave it to the shareholders and your readers to place their own interpretation upon Mr. Pearson's proceedings in the matter. I think it right to state that the Chairman did not know until two days afterwards of the existence of the said memorandum, or of the mention of his name therein.

As regards the debts of the company, which Mr. E. Pearson states are from 40,000*l.* to 50,000*l.*, how does he reconcile this assertion with the announcement made by him on his return from Utah, in 1877, to the effect that the company's whole indebtedness in Utah did not exceed in round figures 3000*l.*, whilst the lessee's subsequent statements of account show that he had paid off more than half of this amount? Mr. E. Pearson knows full well, independently of the declaration in my letter of last week, that there is no intention whatever to resuscitate the present company as such; and, therefore, even if the inflated statements were true, it would make no difference, as all existing indebtedness would apply solely to the old company.

I beg you will correct an error in the printing of my letter of last week. You will find on reference to the original I used the words, "I, as secretary, may be allowed to state that the directors—one and all—do their utmost duty to the shareholders." You have rendered it, "do their utmost duty to the shares." A. A. DE METZ,
Secretary.

STATE PURCHASE OF RAILWAYS.

SIR.—At present some agitation is going on in France, although, perhaps, not a very powerful one, since Mr. Louis Blanc and his communard friends are the principal movers in the matter, for what has been somewhat inaccurately called "le rachat des chemins de fer," with regard to which the République Française remarks that the operation would not be objectionable; but that even to attempt it the country ought to be in a very prosperous financial position, as a large outlay would be necessary before any return could be obtained, the conclusion of the République Française being that this is a singular method of preventing a crisis. The Crédit National very truly observes that, instead of calling it the redemption of railways, the correct definition of the proposed operation would be the conversion of railway shares and bonds into a new security, which would be preferable and preferred to the old one, but which in any case would not be worth less, since the guaranteee of the State would be attached to it. The same authority adds that it is not exact to say that an outlay would be necessary before a return, since it would simply be an exchange, and, far from being burdensome on the public treasury, the operation would be advantageous if the new railway bonds were worked on the plan of the Crédit Foncier obligations, à lots.

The hint thus thrown out by the Credit National appears to be so capable of satisfactory development that too much attention cannot be paid to it. Several very important facts are assumed; but if the assumption be justified the conversion might be effected with equal advantage to the present holders of French railway securities and to the French Government. It does not appear to be disputed that French Rentes are the safest security in France, just as Consols are the safest security in England. The percentage received as interest is lower, but this is more than compensated for by the absence of risk. Consequently it may be supposed that many, tired of the variable results yielded by railway securities, would willingly pay something to exchange them for Rentes, and the Government would certainly be the most competent power to facilitate this exchange upon equitable terms. Holders of any security whatever naturally object to compulsory conversion or expropriation of their property, although they would probably be the first to come in if the conversion were voluntary, and the problem is to devise a voluntary conversion which shall be profitable to the State and acceptable to the present stockholders. The solution appears less difficult than might at first be supposed.

Let it be supposed for the purpose of explanation that the aggregate amount of the railway shares and bonds of French railways is 20,000,000,000 francs; the first step would be to authorise the creation of a Rente Industrielle, which would be in every respect similar to the ordinary Rente, except that the account of it would for a certain number of years be kept separate. The law authorising the creation would expressly provide that no part of the Rente Industrielle should be issued except in exchange for French railway securities, and the same law would also define the powers and duties of the State in the matter, and fix the terms of the conversion. All details would, of course, be the subject of discussion, but roughly it might be suggested that all conversions during three years from the date of the creation of the Rente Industrielle should be at the option of the holder of the railway stock to be converted, the market price of the day upon which application to convert is made being taken as the basis, and 10 per cent. being payable to the Government for permitting the exchange. Thus the converter of securities worth (taking the mean between buyers' and sellers' prices on the Bourse) 10,000 francs would receive Rente Industrielle equivalent to 9000 francs, a sacrifice which most holders would willingly make to exchange an uncertain for a certain income.

The representative of the State would in respect of all railway securities transferred to it exercise all the rights of the individual shareholders who have relinquished (the usual clause limiting the voting power of large holders being overridden), and when the majority of any given class of share or bond shall be in the hands of the Government (as it soon would be), the remainder would be compulsorily convertible, the Government dealing at its option, either at the market price of the day or at the average price of the preceding three years, whichever may be lowest. Should it be deemed advisable to expropriate this balance by instalments the securities to be converted might be determined by drawing. The advantage which such an arrangement as this is believed to possess is that the conversion would be gradual and satisfactory, vested rights will be interfered with to the smallest possible extent, and the State will make a profitable transaction. When the whole of the railway securities shall have been exchanged for the Rente Industrielle the latter will be consolidated with the ordinary Rentes, and the transaction will be complete.—Nov. 19.

H.

WATER-POWER FOR MINING PURPOSES—NO. IV.

SIR.—In continuing my remarks on this subject I beg to correct two sentences in my communication of last week. Instead of "In cases where, however, there might be obstacles of a formidable nature, either by the inaccessible nature of the ground, or where the ground is ornamental, and it would be undesirable that the appearance of any kind of machinery should be absent," the last word in the sentence should be "present;" and instead of the following sentences reading as follows:—"The distance or length of the water-rod would be of little consequence;" "The amount of elevation of one end of the rod over the other under certain circumstances, however, would depend on the manner how it were applied;" it should read thus—"The horizontal distance or length of the water-rod would be of little consequence;" "The amount of elevation of one end of the rod over the other would, however, depend on the manner how it were applied." In cases where all horizontal rods are applied no balancing is required, of course, to overcome difference of weight of one end above the other, but in cases where one end of the rod is above the other a compensating balance must be applied in one form or another, and it is a very easy matter to accomplish this in the cases where either iron or wood rods are used; but the water-rod, while it possesses superior advantages to either wood or iron rods as regards its admitting of being carried through difficult routes, yet it is a totally different thing in practice to either of those. This will be readily seen from the fact that the weight of one end elevated above the other cannot in practice be so easily compensated or balanced, so that the full pressure of the altitude of one end above the other must rest on the lower end, and has to be provided for in the construction of the machine erected to work it.

The ordinary action of wood and iron rods all are familiar with, but the water-rod is capable of three distinct motions. First, the reciprocating motion. Second, the motion in one direction only; this takes place when the water forming the rod is wanted for dressing

the ore or other purposes at the one end, under which circumstances the end of the rod is, as it were, dissolved as it comes, and the same volume filled simultaneously at the other end to keep it intact. Third, the circuitous motion, in which it travels in circle, and by which means any amount of machinery may be connected to it at any point, and at all points. It may first drive the pumping-engine, then the winding-machine, the stone-breaker, the crusher, the stamps, the jigs, the buddles, &c.; in fact, it is peculiarly adapted to be worked about wherever wanted—to drive every kind of machine, small and great. The adaptability of the circular water-rod to mining purposes is of much importance, and it is to be hoped will be taken advantage of. The reciprocating and dissolving rods will to some degree accomplish the driving different machines, but the circular is far superior to either. I would here state by circular water-rod is meant the water driven from a certain point by a suitable machine through a continuous pipe, in which it enters at one end, and returns back to the same machine at the other. GEORGE RICKARD.
London, Nov. 19.

THE PNEUMATIC MINERAL SEPARATOR.

SIR.—Your correspondent, "Miner," writing from Callington, commences by observing that "theoretically nothing could be better than pneumatic dressing, but practically all attempts hitherto made to introduce it have proved to be failures, because pneumatic dressing cannot be carried on economically," and concludes with the opinion that "air dressing can never be desirable," since if steam-power be used the cost would be enormous, and if water-power be available none of the difficulties which air dressing is supposed to remove have any existence."

In the Treatise on the dry system as carried out by means of the Pneumatic Mineral Separator—made public through the medium of your columns—amongst other advantages claimed for it over the wet system, are specified "the minimum cost for dressing," and also "the minimum of horse-power, a small quantity being sufficient for the compressor and the flap-valve;" and reference is also made to the "vast quantities of water, amounting to 50 tons or more per ton of ore, employed to effect a separation at the best of an unsatisfactory character, attended with a large loss of valuable mineral." The issue raised by "Miner" is, consequently, condensable into this:—That less steam-power is used in the employment of 50 tons of water than is required to supply the volume of compressed air employed in the dry system for the separation of the constituents of ore, employed to effect a separation at the best of an unsatisfactory character, attended with a large loss of valuable mineral.

"Miner" also observes, "with water we have only to move the body of the fluid, which can be accurately balanced, so that the whole power is transferred to the ore to be lifted." This is undoubtedly correct, because water, owing to its density, moves practically as a solid, and it is in the transfer of force to the ore that the finer particles of valuable mineral are swept away in the overflow and wasted, as is too well known in dressing tin ores in Cornwall.

The failures in practice of all attempts to introduce pneumatic separation is incorrectly referred to the comparative economy of the two systems; they are correctly attributable to the want of a thorough comprehension of the principles on which pneumatic separation should be conducted, and of consequent errors in the mechanism of the machines.

"Miner" says "we shall have the equivalents of the old Saxon jig anyhow, and the whole body of ore must be lifted bodily (say) 100 times in a minute." Something has happened since the old Saxon jig was invented, and though the pointed box with a continuous ascending current of water may be unknown in Callington it is in use in many parts of Great Britain, of Europe, and of the United States; and an ingenious modification of it by Mr. Nance for dressing tin ore has recently appeared in your Journal. "Miner" cannot have read the Treatise on the dry system with attention, or he would have seen that with air as the medium it is not requisite that "the whole body of air be lifted bodily at (say) 100 times in a minute." With a more attentive perusal it will be seen that in the Pneumatic Mineral Separator the compressed air is employed in a continuous ascending current uniformly varied in pressure, whereby the lighter mineral is immediately and permanently raised above the heavier, and that the oscillations (800 per minute) are used only for the purpose of counteracting any slight inaccuracy in the pressure or density of the compressed air. The separation may be effected without any oscillations or pulsations by stopping the movement of the flap-valve, or by omitting it altogether, as provided for in my patent.

I can give "Miner" facilities for testing his ore on the Pneumatic Mineral Separator, and for establishing a comparison between the actual force absorbed by the compressor and that used in moving 50 tons of water per ton of ore, and transmit to him through your hands a pamphlet copy of the Treatise, with illustrations of the machine.—Colman-street, Nov. 19.

B. W. HART.

ALUMINIUM AND ITS ALLOYS.

SIR.—Some years since there was a very general opinion that aluminium bronzes and aluminium silvers might be brought largely into use for the purposes of ornamentation, and at the International Exhibition in London, in 1862, many exceedingly beautiful specimens were shown, which, in the opinion of competent judges, were superior to gilded articles, such as clock stands, candelabras, and similar things which it was proposed to adapt it for; but although some 17 years have now elapsed the application of the new alloys has been comparatively limited. The project could probably now be revived again, as Messrs. Howard, Bates, and Pendleton, of Philadelphia, have discovered a new process for the economic production of aluminium by subjecting oxide of aluminium, charcoal or pulverised coal, and common salt to heat in a closed crucible, and if this succeeds according to their anticipations we ought to have the finest aluminium golds and aluminium silvers at prices which would compete with ordinary brasses and pewters. The oxide of aluminium which they use is generally produced by dissolving alum in hot water, and adding to the solution carbonate of soda to precipitate the oxide, which, after separation from the solution, is washed and dried. This oxide of aluminium is mixed with pulverised charcoal and common salt in proportions which may be varied to some extent; it may be remarked, however, that good results have been obtained by a mixture of 3 ozs. of salt and 1 oz. of charcoal to every pound of the oxide of aluminium. This mixture is placed in a crucible, and the latter in a furnace, which should be maintained at a temperature of (say) about 700° Fahr. Care should be taken to close the crucible with an appropriate cover, to prevent as far as possible the escape of the vapours and gases. In order to determine when the process has been completed the cover of the crucible is slightly raised from time to time, and if it is found that the gases evolved have a bluish tint the crucible may be removed from the furnace and emptied, when the aluminium will be found at the bottom. Pulverised coal may be used in place of charcoal, but the best success has attended the use of the latter. The process may be conducted on a larger scale by subjecting the mixture to heat in a closed furnace without a crucible.

The second part of the invention consists of the economical mode hereinafter described of making alloys of which aluminium forms a part. If an aluminium bronze, of which copper and zinc form parts, has to be made the copper is melted in an appropriate crucible, and while it is in a molten condition oxide of aluminium and oxide of zinc are added and mixed thoroughly with the molten copper, after which the crucible is closed, and the application of heat continued. The mixing of the oxides with the molten copper should not be continued for more than half a minute, after which a cover should be placed on the crucible, or the contents of the crucible may be stirred through an opening in the cover, so as to prevent as far as possible the escape of gases and vapours. In order to determine when the alloy is in a proper condition the cover of the crucible is raised from time to time, and if it is found that the alloy is in a very fluid state the crucible may be removed from the furnace; if it is found, however, that the mass is in a thick semi-fluid condition it is an indication that it must be subjected to heat for some time longer.

The proportion of the ingredients used will vary in accordance with the desired character and colour of the alloy. For an alloy of deep gold colour, for example, 1 lb. of oxide of aluminium, 6 ozs. of oxide of zinc, with 2 lbs. of copper, may be used. It is not necessary that the zinc which forms a part of this alloy should be introduced in the condition of an oxide; metallic zinc in the desired proportion may, for example, be introduced into the crucible containing the melted copper and oxide of aluminium. An alloy of copper and aluminium may be made by simply mixing the oxide of aluminium with melted copper, and subjecting the mixture to heat, as above described, but it has been found in practice that the addition of zinc, either in the form of an oxide or metal, even if the proportion of zinc be very small, produces a more perfect alloy than when the zinc is omitted. An alloy of copper, tin, and aluminium may be made by first fusing the copper and tin, and then adding the oxide of aluminium.

It will be understood that the proportions of metal alloyed with aluminium by the process may be varied as the desire product may suggest. Metals other than those referred to may be added to the copper, or nickel may be added to white alloys when a brilliant surface is desired, and this being so, I see no reason why we should not have some brilliant metallic ornamentation by the use of these alloys at a very moderate cost.—New York, Oct. 24.

ARGENTALUM.

SULPHURIC ACID MANUFACTURERS.

SIR.—I understand that in consequence of the combination among the pyrites companies last year to raise the price of pyrites an association was formed by the sulphuric acid manufacturers with the view of developing other sources of sulphur supply. I am desirous of communicating with the secretary or other official representatives of this association, and shall be glad if any of your correspondents can favour me with the name and address.

BRIMSTONE.

THE INSTANTANEOUS FUSE AND IGNITER.

SIR.—In reply to Messrs. Bickford, Smith, and Co., though not present at the public trial at Wheal Agar I am not so ignorant of the above article as they assume, as I witnessed an experiment with the identical fuse more than a month ago. I do not feel bound to give a detailed account of the plan I adopted for simultaneous blasting without electricity, but I repeat that in principle it is essentially the same as theirs, though I am quite ready to admit that their invention was worked out independently of mine, and that it is more complete. At the same time I consider it is vastly inferior to one that has now been before the public for many years.

To admit, as Messrs. Bickford, Smith, and Co. indirectly do, that the instantaneous fuse and igniter is equally as dangerous as ordinary safety-fuse, it is not very reassuring to those who know that many serious accidents have been caused by the latter, more particularly in its liability to "hang fire." The stringent rules enforced at most mines in relation to missed holes is a practical proof that it does not afford that immunity from danger which they claim for it, and it is more than questionable if it possesses any such advantage over the old mode of straw firing. I have known a mine (one of the largest in the kingdom) for over 12 years where straws have been used almost exclusively, and I do not recollect a single premature explosion, or an accident happening in firing during all that time. Can Messrs. Bickford, Smith, and Co. say as much of safety-fuse?

What we want for the miner, especially where holes are fired in groups, is something absolutely free from dangerous qualities, so that he can return to his work after blasting with a sense of perfect safety. Such conditions are fully secured by adopting electricity as a blasting agent. With respect to Bornhardt's machine which we have used for over two years with the utmost success, and assuming that they have one of the same type at Wheal Agar, I cannot think they have finished from the public trial because it was not to be depended on.

Rushen Mine, Nov. 18.

JOHN BARKELL.

DARLINGTON ROCK-DRILL.

SIR.—Two or three typographical errors in my letter last week destroy the sense of it. I am made to say in two different places sinking instead of "working" and "boring," and axle for "arca."

When writing my letter I did not know such a storm was raging round the very drill which has done its work so exceedingly well here that Mr. King and myself thought the fact deserving of something more than a private record. It is none of my business to explain why the Darlington drill did not compete at the recent trial, but, to judge from Mr. Waddington's challenge, which I hope he will maintain, I should say it was not because of any inherent defect in its boring capabilities. I do not think any good will come from the controversy about it if the correspondence is to be the avenue for spiteful and venomous attacks on individuals of the nature contained in your columns last week. At the risk, however, of being maligned, I cannot stand coldly by and see an article of such merits as the Darlington drill denounced and abused without uttering my protest.

No doubt there are several machines that will do very well to exhibit at shows, and bore rapidly too, but I think all practical men will agree with me when I say that the *sine qua non* of a good drill is simplicity, rapidity of boring, durability, and immunity from repairs. For simplicity the Darlington is unequalled, it being impossible to obtain a reciprocating movement with fewer parts. Completely stripped, therefore, of the complicated gearing and numerous appendages clustering around most machines, the Darlington is a most suitable article to put into the hands of men who are good miners but poor mechanics.

The drill also fulfils the next condition. It is a rapid borer. As an actual fact we have bored in a shaft with two drills 100 ft. in five hours, including the loss of time incidental to changing tools, shifting position, &c., and throughout a long sink (over 20 fms.) we obtained a weekly rate of sinking in excess of the total accomplished by hand in a month, and this at a cost, including everything, about one-half less than the previous sink of the same depth. To be brief, the Darlington drill, both in sinking and driving, has so expedited work here that I consider the position of the mine to-day is at least three years further ahead than it would have been with hand labour only, and in "dead" charges alone, irrespective of the lessened cost per fathom, this represents a saving of over 1500*l.* The drill is also remarkable for its durability. We have worked one for about 15 months on nasty ground for racking a machine, and though it has never been to the doctor it is in thorough working order now. I venture to say that very few drills would, under the most favourable conditions, exhibit such wear-resisting properties. It is only fair to state that this drill was turned out of hand in a most creditable manner by the Sandy-croft Foundry Company. Owing to the few moving parts, repairs are comparatively a very small item. They comprise, when the machine is in constant work, a new feed nut about once a month and a new feed bar once in three months; the other repairs are so insignificant that they can be covered for a few pence per month.

In other mines the qualities I have enumerated are duly appreciated, and instead of the machines declining they are preferred even to the Eclipse. I could name a mine, too, where this drill was set to work with a great flourish, and had all the advantages of water-power for compressing the air, but the company gave the thing up, and returned to hand labour. I have not heard of such a fate befalling the Darlington.—Rushen Mine, Nov. 18.

JOHN BARKELL.

BORING MACHINES

SIR.—I notice frequently amongst your correspondents a gentle man who signs himself John Barkell, whose sole business in his correspondence appears to write up the Darlington drill and its apparatus. Will Mr. Barkell kindly answer one or two questions in next week's Journal? Has Mr. Barkell ever worked any other drill besides Darlington's; second, has Mr. Darlington any interest in the Rushen Mine, from which Mr. Barkell addresses his correspondence—if so, then what is Mr. Darlington's interest is also Mr. Barkell's, and, consequently, Mr. Barkell's opinion cannot be altogether called disinterested, and as such cannot have so much weight as one whose experience has been gained with a large number of machines. I saw the Darlington drills at work at the Talargoch Mine, and offered the company one of my own drills for a month's trial upon the condition that if it did not do more than 50 per cent. more work than Darlington's it should be returned free of all cost. The drill not only

did what I said it would, but more than doubled the speed of boring as compared with Darlington's, and, in addition, used considerably less air. The company were so satisfied with the first machine that I have since sent them a second, and have no doubt I shall receive further orders.

JOHN SHAW.

Woburn Hill, Stoneycroft, Liverpool.

BORING MACHINES.

SIR.—It is a pity that inventors of boring machines and their agents, instead of writing letters about the superiority of their machines, do not induce the managers of mines where their borers are used to furnish your readers with statistics of the actual progress made underground. We have had too many surface trials for miners to be taken in by them, though they may amuse others.

I was present at the trial in London of the Darlington borer before the Society of Mechanical Engineers, when 7 in. per minute was bored in hard granite, but as Mr. Darlington is a practical miner I am certain he would admit that if such speed had been doubled the practical test of suitableness for the miner would not be thus proved, and I can hardly credit the assertion that he has ever entered his borer in any surface competitive trial whatever. In the hope of getting some statistics of the work being done by machines in other mines I furnished you for the Journal of Nov. 8 with the statistics of the last 11 weeks' work at the Ballacorkish Mine, where previous progress has been described, the borers having been long in use there. I fully expected some mine agents or directors (uninterested like myself in any machine, beyond the desire for the survival of the fittest for the work) would have also given some statistics of work done by other machines in a similar tabulated form. If any one has done better work with one machine than 1 fm. per day in greenstone and hard killas with six miners, and at 250 fms. from a shaft, miners would be glad to know it, as it is too early to expect that perfection in the use and application of rock-boring machines has yet been reached, and information of progress, with its cost, is much wanted from the users of the various machines before the public.

London, Nov. 19. — FREDERICK J. KING.

ROCK-BORING MACHINERY.

SIR.—In the correspondence on the subject of rock-drills, which appeared in last week's Journal, the Darlington Drill is freely referred to. I desire to state, for the information of the writers of the various letters—1. That I attach no importance to results obtainable from the trial of machine drills at surface—running down a hole in a loose stone, and simply recording the time of boring it.—2. I have never entered the Darlington Drill for a competition trial with other drills either in Cornwall or elsewhere.—3. The Darlington Drill, which bored at the rate of 4·4 in. per minute in the porphyritic stone at Wheal Agar on Nov. 4, is not fitted with a cylinder 4 in. diameter.—4. The drills in use at the mines referred to are the property of the company, and are not in any way under my direction or control.

To those of your readers who may be acquainted with me, it will be unnecessary to state that whilst I have laboured to reduce a boring machine to the fewest parts possible, I have also persistently urged the necessity of employing good and reliable air compressors, air pipes of large diameter, properly mounted boring machines, the employment of trained hands to run them, and an effective organisation of the entire work. A boring machine can do nothing of itself—its practical merits must depend upon its strength and constructive arrangement and efficiency of the auxiliary apparatus and an intelligent use of its power, and not on a pretentious name or on illusory claims.—London, Nov. 18. — JOHN DARLINGTON.

WHEAL AGAR—BORING MACHINES—ECLIPSE DRILL.

SIR.—Your columns twelve months ago bear testimony to my contradictions of false statements respecting the Eclipse and other drills. Verily the Eclipse, so called, can only live by false statements decrying the merits of other machines or misrepresenting their own. A well-known saying, which I am not going to endeavour to controvert is "Give a liar a week's start and he will defy his pursuers overtaking him." Such seems the motto of writers who make the following assertions. H. Willmott says—"I expressed a regret that a clamp had been forgotten." This is untrue. No Darlington machine was ever entered for working for the Exhibition last or the present year. I could, therefore, have no reason to express regret. That the Darlington machine has declined in the estimation of Cornish people is equally untrue; so far it is the only machine which has been driven ground at 75 per cent. of hand labour price, all expenses told, and that in ground for which we paid by hand 22d. per fathom. There is no reason why we should not drive for 60 per cent. of the usual cost. The present level where the machine is working is within 2 fms. of the bottom of the shaft. I need not, therefore, tell any mine agent we have not averaged five clear days per week, yet we have driven 2 fms. per week. How many fathoms has the Eclipse driven in the adjoining mine in ground not to be compared with Wheal Agar—at 14d. per fathom, in a level 40 fms. above the bottom of the mine, subject to no interruptions? Nay, has not the speed been so exceedingly unsatisfactory to the manager or East Pool that six or nine men were pitted against the machine, to the great fear that the Eclipse would be eclipsed by hand labour?

What did the Eclipse do at West Bassett? Did they not have pick and shovel ground at 9d. a fathom? I have heard an agent say "they could drive their levels faster by hand, and that they wished they had never seen the Eclipse drill."

Messrs. Hathorn and Co. are equally incorrect. The drill exhibited at the Camborne Exhibition in 1878 was never intended to be run there, but was sent as a new machine, the first screw I had seen, over which I had no more power than Mr. Hathorn himself. So much for Messrs. Hathorn's veracity. I do profoundly pity an opponent's case that has no argument or reason, but must impinge "spite." What dislike can I have against the toy and bellows? I have raised my protest against the misrepresentations teeming from Willmott, Hathorn, and Teague as a caution to all who may entertain the idea of using boring machinery.

We will give Mr. Hathorn's agent the opportunity of running his machine alongside the Darlington. Or he may run his machines in the 225 fm. level east at 17d. per fathom, cost price to us, and after his week's run we will run Darlington's. Let this be the practical solution of the question.

Mr. Harry Teague's letter is written in ignorance or knowingly untruthful. We have no 4-in. drill of Darlington's, and never had. The drill we have is nearer 3½ in. Mr. Darlington's engineer had not gone down to superintend the trial of the drill at all. His object in visiting the county was to see Beaumont's engine and compressors, and report on their suitability for a neighbouring mine. This writer does not tell you the point of our first borer was one half broken away, and that the chips of this steel must have been pulverised before the stone could be further cut. Yet this machine bored 20 in. in 1 min. 20 sec. less time than the Eclipse. "Oh!" says Mr. Teague, but "Mr. Waddington should have reduced his work to an arithmetical calculation." I have heard it said figures can be made to prove anything, and so it would appear. This wonderful mathematician can tell you unseen the pressure of air used, and the thousandth part of a grain of the stone pulverised. By his supposing that the Darlington borer wore away at the corners, and supposing it did not. Supposing the bottom of the hole was a cone, then the Eclipse was a straight hole, in short, a perfect parallelogram, then the Eclipse did more work than the Darlington, which bored an equal hole in about 3 minutes less time than the Eclipse.

Is it not, Mr. Editor, beyond conception that "eminent engineers" should attempt to throw dust in your eyes in this way? If one hole was conical, and that was bored in the same time by the same machine, then that was the best machine, for it shows unmistakeably that had better steel or a better tempered borer been used the hole would have been cut in much less time. Let me tell this great pupil of Euler the cutting face of the borer was quite flat, broad when taken out; had the point stood well 3 minutes would probably have been the time required. There is nothing special in the steel of 1½ or 1⅓ we used; it cost us less than 30s. per cwt., or probably less than half what was used in the Eclipse. The pressure on the day I

saw the holes bored was the usual pressure, and I have every reason to believe was no greater than when the Eclipse was tried.

In all the correspondence re Eclipse I have had to combat nothing but untruthful statements. The Eclipse drill has not done better, nor so well, as every drill yet tried in Cornwall. The faults have not been in the machines from Döering to the present time so much as in having trained men, of whom the Eclipse found several. Before I reply to any further correspondence let me beg them to adhere to the truth, and not expose their bad case by wilful misrepresentations.

One word more on the cost of plant and working. At Wheal Agar our engine and compressor are capable of supplying four or five drills. We have but one, and sometimes two. The result is we cannot work the engine slow enough, and turn the centre with 50 lbs. or 55 lbs. pressure in an 18-in. air cylinder, with a pressure of 40 lbs. in the steam cylinder of 20 in. diameter, being a single engine. The consequence is more air is compressed in five minutes than is used in ten minutes, and the engine must stop until the pressure runs down. The evils resulting are two—uneven air pressure from 60 to 45 lbs. per inch, and great loss of available power. If four or five drills were regularly running the cost of coal, oil, and men's wages would be divided by five instead of being debited to one and occasionally two machines. From this it will be seen that the 75 per cent. cost should be reduced to 60 per cent. This at the cost of a little or any more coal than the Eclipse bellows. How contemptible are their pretensions.

Nov. 18.

H. WADDINGTON.

JET MINING IN YORKSHIRE.

SIR.—The manufacture of jet into ornaments is an occupation for which the quiet old town of Whitby has long been famed, and that justly, for considerable artistic ability is shown in the brooches, bracelets, earrings, necklaces, and watch chains so cunningly wrought out of the pitchy-looking mineral. Little is known of the method pursued in obtaining jet, or of the districts and strata in which it occurs, and to supply this information in a short manner is now the writer's object.

Dr. Page, in his "Hand-book of Geological Terms," informs us that the word jet is derived from jayet or gagite, terms in their turn derived from Gaga, the name of a river in Asia Minor. Dr. Page considers jet to be more of the nature of amber than of coal, and states that in Prussia it is known as "black amber."

The Yorkshire jet mines are situated in the North Riding, and are to be found principally within a few miles of Stokesley. Some jet is obtained from the sea cliffs in the immediate neighbourhood of Whitby, but this is not mined for, but sought in open workings. The mines are mostly on the spurs of the range of hills lying to the south of the Stockton and Whitby Railway. Jet mining has been prosecuted in the Eston range of hills, and also in the neighbourhood of Rosedale Abbey. The bed in which the jet is found is a stratum of alum shale, about 18 ft. thick, lying a few fathoms above the main seam of ironstone, now so extensively wrought in Cleveland. This shale is bituminous, and a thin piece when lit will burn of itself; on being exposed to the action of the atmosphere it sometimes takes fire, and assumes then a reddish hue, due to the iron it contains; water flowing through heaps of this burnt shale leaves it impregnated with alum, and destroys vegetation.

The search for jet is always commenced at the outcrop of the alum shale; shafts are not sunk either to win or work it. A drift 6 ft. high by 3 or 4 ft. wide is driven in from the outcrop, and if the prospect is cheering a companion drift is put in at a distance of 5 yards away, and the two are connected so as to secure ventilation. Very little timber is required in these drifts, as the jet-bearing rock is of a tough character. When these drifts have advanced a few yards side excavations are made, and the systematic search for jet commenced. The shale over the roof of the side drifts is hewn or wedged down, and, serving as a platform to work on, the whole thickness of the shale is explored much after the fashion of overhand stonking in a metallic mine. While the preparatory drifts are being driven the shale has to be conveyed outside, and tipped on the slope of the hill, but in the regular course of working as little shale is taken out of the mine as possible. Trams or kibbles running on flanged rails are used for bringing the shale out of the mine to the waste heap. The jet lies irregularly through the whole depth of the shale in flattened masses, varying in thickness from a wafer to 3 or 4 in., and in length up to several feet, the breadth of the mass being a few inches. A piece of jet is termed by the miners a seam. When a seam of jet is discovered it is carefully followed, and excavated in as large pieces as possible. Sometimes weeks will go by and no jet be found, while occasionally there will be exceptional luck, and a great haul of good jet made in a few days. If in driving the exploring drifts no jet is found they are sometimes abandoned without side excavations being made, and operations commenced further along the outcrop. No gunpowder is used in working the shale; its action would injure any jet lying near, and the nature of the shale is opposed to the successful use of explosives.

The shale in which the jet is found becomes much more difficult to work as the outcrop is left behind, and for this reason the drifts seldom advance as far as 100 yards. When exploring near the top of the shale the roof frequently gives way, and a fall to the surface takes place; in this way ventilation is often secured.

The number of men employed in jet mining is difficult to arrive at. Most of the mines are worked by a partnership of two, four, or six men, who have usually other work to which they turn their attention in dull times and in the summer weather. It would also be a difficult matter to state the quantity of jet produced annually. Probably not more than 100 men are employed in jet mining in Yorkshire.

An explosion of inflammable air is reported to have taken place in a jet mine some years ago. It would probably be due to oily vapour exuding from the shale. In the ironstone mines of the district explosions occur now and then, probably from the same cause. In 1873 a jet miner was killed by a fall of shale.

It is a mistake to suppose that the district under discussion supplies all the jet used in Whitby. Foreign jet is largely used there. The foreign jet is not so durable as that raised in the district, and is much more apt to fly to pieces on sudden exposure to the sun or other source of heat.

If the shale excavated from the mines could be put to some use, and it must be remembered that it contains both oil and alum, this, in conjunction with the working of jet, might make it a subject worthy of the consideration of capitalists.

J. B. A.

PANT-Y-MWYN LEAD MINE, NEAR MOLD.

SIR.—I have for some time felt greatly surprised at the silence of the directors of this well known valuable sett. Is it because of their having put too much confidence in their late manager, or is that they wish to keep the good news to themselves and a selected few? If so I should advise them to shake off these ideas and let the fortunate shareholders know from week to week, through your valuable Journal, the prospects of the mine and the work going on there. Being a shareholder "in August last," and feeling dissatisfied with the management at the mine, I secured the services of a thoroughly reliable and practical mining agent to inspect the underground workings. His report was everything that could be desired as regards the immense reserves of lead, but completely condemned the mode of playing with the water, and the general method of working the mine. From his report I also gleaned that nothing scarcely had been done during the preceding 12 months towards developing the property, and that the day level had not been wrought upon, as many of the shareholders had been led to believe. These facts were brought before the directors, who at once bestirred themselves, and secured the services of a well known practical manager, who is every inch a miner. A few days after his appointment he thoroughly explored the old workings as far as water and mud would admit. His work I understand in so doing is calculated to prove most valuable to the shareholders. He discovered large deposits of solid ore, and gives it as his opinion that the work of cleaning out the level in question will be very slight to what had been represented by the late manager, and when done there is nothing to prevent the mine proving one of the best and continuous dividend paying mines in Wales. A few days ago 20 tons of ore was sampled, which realised close upon

12d. per ton, and I am informed that a body of men working in the 30 yards level have struck upon a prize of great value. I am also glad to learn the directors have at last purchased a new powerful engine of the most improved construction, which is to be at once erected on Medlyn shaft.

The following is a verbatim copy of a report from an experienced and well-known Shropshire mining manager:

Sir.—Having visited Pant-y-Mwyn Mine, I beg to hand short report. The upper part of the mine has been extensively worked, and has yielded large quantities of lead ore. The 30 yards level, east of Griffith's shaft, has been driven 76 fms. in a continuous lode, composed of lead ore and lime spar; the bottom of this level is rich for ore for 30 or 40 fms. long, dipping towards Medlyn shaft. I should advise a good engine to be put on the Medlyn to cope with the water and sink the same on the lode. Pant-y-Mwyn will then prove one of the best in Wales. The specimen of lead ore broken by myself from the bottom of the 30 will, I think, show you what it is like; a finer looking lode I never saw in all my life. You have a splendid field here."—N.B.: The foregoing is from a gentleman well acquainted with the lodes in the celebrated Roman Gravels, Tinnerville, and other dividend-paying mines in Shropshire.

Now, Sir, I think I have said enough to prove to my brother share holders that the silence of the directors, who I know to be gentlemen of strict integrity and perseverance, is not caused from want of something encouraging to communicate. Hoping they will take the hint and let us know our true position from time to time through the medium of your valuable and widely-circulated Journal.

A SHAREHOLDER.

SOUTH DARREN SILVER-LEAD MINE.

SIR.—During the past three months a great improvement has taken place in this mine, which promises to become one of the richest properties in the district. They are selling 50 tons of silver-lead ore per month; this I understand will shortly be increased to 60 tons, and so on, excluding their copper sales. The October sale left a profit of nearly 360*l.*, and the November sale, on the 28th inst., will give a profit of about 380*l.* Then future prospects are most cheering, and the sales of ore speak for the mine; it is undoubtedly a first-class lead property, and, judging from facts, shares are worth double their present value. I find there are only 9000 shares in this company; they are fully paid up, and limited.

London, Nov. 21. — AN INVESTOR.

WENDRON MINES.

SIR.—Where are the shareholders of Combellack Mine, situated in the parish of Wendron, about three miles south-east of the town of Helston? I have not heard of any winding-up of the concern, and should, therefore, suppose the company still in existence. Now tin is advancing, and a very fair promise of continuation, it is a mystery to several parties that the shareholders do not recommend operations in this valuable sett, which they could do for a small outlay. They would have only to purchase or borrow a small portable engine, which would be of quite sufficient power to drain the mine, and further develop it. The adjoining mine has had some very good deposits of tin, which have a north-west dip, and which must certainly drop into Combellack property a fathom or so west of their present workings. I have not the slightest doubt if Combellack shareholders would resuscitate and drive their bottom level west a fathom or so further they would meet with a splendid run of tin ore ground. I trust this will meet the eye of some of the old shareholders, and induce them to act as I suggest.

C. T.

CHIVERTON AND EAST CHIVERTON.

SIR.—I trespass on your usual indulgence, knowing that the Journal is always at the service of legitimate mining, and hope to get some tidings of the working plans and sections of the above first-named mine, worked some years since under the care of Capt. John Borlase (if I am rightly informed). I may say that before troubling you I made enquiries of others who seemed likely to know, but without obtaining the information I wanted. My object in obtaining the plans is to clear up the point whether East Chiverton's western ground could not be opened out in a little time and at small cost by means of Chiverton's old shafts and workings, two of which have been included in the recent addition to East Chiverton sett westward. Formerly this portion of Chiverton sett interposed between West and East Chiverton, which are now adjacent, and from what I could gather, as well as from appearances, it seems that the old shafts of Chiverton could be made very useful in opening out the valuable western ground of East Chiverton. Of course this could be settled at once if the plans and sections of Chiverton could be obtained, and I hope that if any of your readers be able to give some information on this point they will not fail to do so, and thereby do their mite towards the welfare of a district long under a cloud, yet soon going to emerge from it owing to the bright prospects of East Chiverton.

J. B.

SOUTH CREBOR MINING COMPANY.

SIR.—Permit me to say that this mine was formerly known as Wheal Courtney, and is a portion of the once famous East Russell sett, from which so large a quantity of rich copper ore was raised. Let me also add that the promoters of this company have not brought out any other mine in the counties of Devon or Cornwall. The directors are men of high respectability and standing, and have purchased their qualifications (high though it is), which proves their confidence in the concern. They purpose, I believe, commencing operations to-morrow, the 20th inst., and intend to develop the property vigorously, and those shareholders who know it best are not afraid to wait the result with—

A SHAREHOLDER ONLY.

BRYN GLAS MINING COMPANY.

SIR.—Considering the auspicious circumstances under which this property is being developed, the directors and shareholders, present and prospective, may safely be congratulated upon their good fortune. No question can exist upon ultimate success. The property is situated, as my personal knowledge of it enables me to assert, in the centre of the richest lead and silver district in Cardiganshire, in fact on the confines of the mines through whose working Sir Hugh Middleton netted, as existing documents prove, nearly a million sterling, and where, owing to the enormous yield of silver, the king (Charles I.) had previously established a mint, and from whence during those turbulent days the royal exchequer was liberally supplied. If such results accompanied the rude and imperfect manual labours of those periods, what may not be expected by the application of the experience and the refined machinery of the present day? One feature must not be overlooked with regard to the Bryn Glas Mine, as it affords the most encouraging hopes to the investors. This is most highly important.

The mine is situated in the immediate centre of the richest silver-lead districts in the county, where upwards of 30,000 tons of rich silver-lead have been obtained at the shallow depth of 22 fathoms; of this the Bryn Glas itself has afforded 3200 tons. If such enormous wealth is attainable with a comparative scratching, what may not be expected at depth? Experience shows that in this district the richness always increases with the depth, and such will unquestionably prove the case with the Bryn Glas unless Nature's laws are reversed in this particular instance, which would prove a miraculous event.

Change-alley, Cornhill.

W. WHITE.

BWLCH UNITED MINES

SIR.—Travelling as I do occasionally in Cardiganshire, and having some knowledge of its mines, I was not surprised to read about the lode being cut at the 100 fm. level in the Bwlch, and from the position of the mine, and the fact that up to the 60 fm. level it

the latter full of minerals cast on one side as worthless, but with the improvements in dressing apparatus, and the use of a stone-breaker, large profits can be made from this source alone. I am informed that the old crushing wheel will be at once replaced by a new and powerful 40-ft. one in view of the importance of the mine has acquired. Those shareholders who took advantage of the large amount expended on this property will be amply repaid for their confidence. The shares must attain a legitimate and high figure. TRAVELLER.

MINING IN MONTGOMERYSHIRE AND NORTH WALES.

SIR.—Miners in the Montgomeryshire metalliferous district will feel much indebted to your North Wales Correspondent for his interesting remarks on the strata in the neighbourhood of the Van Mine; it is also to be hoped that he will oblige with further information on the same subject. I am glad he admits that the Cambrian Mine is an exception, in the case of a copper lode proving productive in the upper portion of the Lower Silurian strata. Are there no other mines in the district which prove the exception? One, I believe, is the Nantyricket; had it been properly developed I believe it might have been profitably worked. The workings have been confined almost to surface I might say, and the bunches of ore were rich, assaying, I am told, 12 per cent. for copper. This is not many miles from, and with similar geological features as, the Llawn-y-Glyn Valley, where "Miner" writes so sanguine about discovering a profitable copper vein. With due deference in regard to your North Wales Correspondent's opinion as to the likelihood of a trial for copper ore in paying quantities being a failure at Llawn-y-Glyn, I believe he will admit that there is a large extent of the metalliferous rocks of the county east of East Van workings, hitherto unexplored, and which is well worthy of trial. There are instances in the district of lead lodes proving cupriferous when they pass from the hard blue slatey rocks of the Llandeilo strata into the sandstone beds of the same. Gwestyn, Nant-Melyn, and Snowbrook Mines are instances. The lead lodes of Dylife and Dyfngwm Mines mentioned by "Miner" generally yield yellow copper ore in paying quantities when they traverse the less argillaceous beds of the Llandeilo rocks. Further west, too, at Glaslyn and Hyddgyn, the same characteristics are apparent. I hope Mr. D. C. Davies' book on "Minerals and Mining" will bring some light to bear upon this subject. We want more geological literature to aid the Welsh miner to define with some degree of accuracy the mineral zones of the Principality. When shall we have a new edition of Ramsay's "Geology of North Wales?" It is to be hoped it will take the more practical form of Sir H. De la Beche's work on the "Geology of Cornwall and Devon." The present edition, now out of print, gives very few particulars of the local geology of the metalliferous districts. I hear that Messrs. De Rance and Strahan, of the Geological Survey, have been carefully surveying in the carboniferous district of Flint and Denbigh, and I hope they will extend their researches into the Montgomeryshire and Cardigan metalliferous districts, and favour the mining public with a more practical work on the geological and mineralogical character of the country than has so far appeared.—Nov. 19. H. S.

THE LLANRWST DISTRICT—No. IV.

SIR.—Having treated briefly in my previous letters on the Llanrwst district of the Bettws-y-Coed, Llanrwst, and the Pandora Mines, which, with the Coed Mawr Pool Mine, form a group central in this interesting and unquestionably prolific district. It is seldom that the evidence of exuberant metalliferous wealth is so manifestly abounding as it is here. The whole region round about for miles appears to be charged with metallic ores, almost vocally inviting, if not invoking, attention. The apparent super-abounding wealth of these—here picturesque, there romantic—hills has unfortunately been attended with one and not a singular drawback—to much was expected at too early a period in the shape of results; the exception in its favour was drawn so as to admit of no qualification, and, consequently, no provision was made for even the most casual natural adverse occurrences—such as temporary obstructions arising from incidental changes almost, if not altogether, inseparable from the enterprise of mining. The inspiring outlook was responded to by the most sanguine thrilling enthusiasm, which being genuine was contagious, the expression of which affected others, even many who had not witnessed the phenomena; and thus expectations were formed and entertained which nothing short of an unexceptional line of success could have consummated, failing which, from whatever cause or circumstance, disappointment must inevitably supervene. That has happened which in a majority of instances was certain to occur unless specially provided for and guarded against at the outset. But occurrences of this kind instead of bearing adverse testimony in respect of the prospects and value of the district is just the reverse; it simply proves that this is similar to all other permanently good districts—that the bulk of its wealth lies treasured in the bowels instead of being exposed on the face and shoulders of the protruding rocks, to get at which and make available the usual instrumentalities directed by skill, energy, and patient perseverance must be resorted to and applied. Let this be brought to bear on the mines I have briefly descended on in these letters, and that which I now propose to treat of—the Coed Mawr Pool Mine—and the chances are a hundred to one that each will prove a sterling, if not a startling, success.

The Bettws-y-Coed, Llanrwst, and Pandora Mines having been brought to your notice in previous letters, it now remains to treat of the Coed Mawr Pool Mine, after which I may probably notice one or more of the most prominent contiguous or outlying mines of the Llanrwst district proper. The Coed Mawr Pool was once the most prominent mine of the district, and now needs only to be worked with that spirit and energy which its unquestionable merits so fully entitle it to take its place amongst its sister mines of this estimable group. I say estimable advisedly—the large returns made from each, regarded with their future prospects severally and separately considered, fully entitle them to such a distinction, especially when, as in the case of these mines as already referred to, it is derived from the exceptionally large returns made from each at comparatively shallow depth, and their several future prospects unsurpassed in the general features and strength of evidence by each prospectively they are each and all supported. The Coed Mawr Pool Mine is an extensive property having an unrestricted area of 200 acres, traversed by numerous known lodes; some of which, those which have been laid open and operated within the somewhat contracted limits hitherto prosecuted, have all more or less proved productive, and some of them eminently so. Whilst of the deeper levels the deepest is the most productive; and as the surface contour of the ground—the surface of this mine being several hundreds of feet lower than the neighbouring mines of the same group—it's active development would be regarded as the pioneer—stratigraphically considered—of the other mines by which in part it is surrounded.

This mine has only yet been prosecuted to the depth of 28 fathoms from surface, that being the limit of the present mechanical appliances for draining the mine of water; or rather it may be more properly stated they lack the motive power—surface water—to operate the machinery—water-wheels, &c.—which they have on the mine. Their supply of this, when abundant, economical agency being dependent on the seasons, and not on any perennial source, or sources, consequently the supply is fitful-spasmodic, so that the wet seasons merely suffice to rid the mine of the water which accumulates during the dry seasons, and hence no progress can be made in deeper developments, and but little effectively at the present depth, at the lower workings of which, and apparently, I am informed, in the bottom of them the richest ground and best prospects are presented. To extract the unquestionable great wealth of this mine superior pumping power must be provided, or the drainage level from near the Llugwy river, already extended some distance, be driven up to unwater the mine, which it is stated it would do 30 fathoms deeper than its present bottom. This I understand is about to be proceeded with, and I add the sooner the better, both for those immediately interested, the general interests of mining, and of this district in particular. It is useless to boast of vast wealth underground if proper means are not resorted to bring it to light and make it available.

The mines I have enumerated in this connection are unsurpassed by any I have yet seen or known of at a similar stage of development

both as respects their intrinsic and prospective values. The Coed Mawr Pool Mine, it is authoritatively stated, has yielded 12,000t worth of lead ore, notwithstanding that the workings are of the most limited extent, whilst the resources of the mine are far from exhausted at the present shallow depth, and recent reports furnished by independent agents and engineers of considerable experience all agree that the mine was nowhere richer or more productive than in the bottom levels and in the bottom of them. I venture to state, and I think I risk nothing in doing so, that these young mines are without a parallel in their yield of ores, their present value, and future prospects.

In many districts persons are found searching for mines, spending money, and incurring obligations for the purpose of ascertaining whether or not the concessions they have acquired contain a lode or not, whilst in this district there are not only lodes abounding, but lead and other ores abounding in the lodes, and not only near the surface, but with underlying prospects of the first order, indicative of their continuance in depth. Nature certainly is not at fault here, her provisions and resources are numerous and exuberant, and it only needs ordinary means, with a suitable adaptability in applying them, to realise a bounteous reward as the result of well-directed energy. The only conditions of success here are a proper systematic development of the mines, a fair price for their products, and their success is then assured.

VIDE ET CREDE.

MINING IN THE LLANARMON DISTRICT.

SIR.—Having described the mineral range of country on the line of the Westminster lodes, and the new range of parallel veins at the Bodidris Mines, it now remains to notice the virgin track lying to the south of the old Belgrave Mine, and north of the old Westminster, in which are already discovered five main bearing veins, in a line transversely through the measures from east to west, and parallel with those in the adjoining mines on each side. There is an adit level driven from the River Alyn from one of these veins for 200 yards in length, which if brought up to the bearing rocks would drain them for practical working 150 yards deep, and in these advanced days of rock drills this could soon be accomplished. Although these veins present every appearance identified in those of the adjoining mines, and have already produced lead ore as strong in bulk and extent as any of them did in the early stages of their history, when worked only to the shallow depth that these have been, there has been little or nothing done to prove their value since the period I mention (over 30 years ago), although from their geological position, with the same channels of cross-courses, and the Aberdove and shale rocks traversing through the stratification from north to south (the strata dipping south-east), and other corresponding features, I cannot see any reasonable doubt of these lodes becoming equally as rich when the deeper eastern measures are reached as those adjoining, and this was the opinion of those professional men who spoke of the property at that time, and whose signal successes in the various mining enterprises then existing with which they were connected I have always considered entitled such opinions to more than ordinary consideration. It is certainly easy to speak of a property when success has been established, and to assume a foreknowledge of what would happen, as may possibly be imparted to me in writing on the Bodidris Mines; but here is a valuable piece of untried country, with the veins discovered and ore worked to a certain depth, and yet nothing is now being done on them. I trust this will give me a fair opportunity of predicting that these veins will, when again prosecuted, prove as abundantly rich as any yet found in the district. I hope I have done full justice to my remarks on this property, and, in fact, shown in them "the roseate hues of early dawn," as it was my wish and intention to do. In the further consideration, however, of operations in this locality, though I shall hope to do justice in giving them a fair share as mineral properties not yet sufficiently developed to give them more than an appreciatively speculative value, I must adopt a more sober tone, I fear, in writing on them, which, perhaps, may better suit partisans of a more gloomy temperament, who occasionally elect themselves as self-constituted guardians of the public weal.

OBSERVER.

LLANARMON LEAD MINING.

SIR.—I notice in your last issue that your North Wales Correspondent accuses me of discourtesy, and that I am evidently becoming chagrined the more I know of the Llanarmon mining district. With respect to the first, I would say—not egotistically—that I am known amongst my friends, whether mining or otherwise, as never being afraid of calling a spade a spade, and if my criticism of any remarks he may have made on anything I have written has touched his tender feelings, it will be better for him to be careful not to "quip and gird" anyone else who may say something that may not be palatable to him. I, however, disclaim any desire or any intention to be discourteous to him. But if he says anything by innuendo, or insinuation, or a straight blow from the shoulder which may be at all detrimental to the interests of truth he should not call "Peccavi" the first, if, by another straight blow, he can be set right. I cannot understand how a correspondent can make himself so ubiquitous as he appears to be, and express opinions upon all sorts of subjects, and always be right. In fact, it seems to be a misfortune with your North Wales Correspondent, and shows a want of definiteness of information, as he is almost week by week taken to task by some of your able correspondents for misstatements, wrong suggestions, or improper conclusions. I like to read his articles generally, for all that. He seems to be a man of metal. I have no discourteous feelings towards him. Why should I have? As to his insinuation of my being troubled with "chagrined" the more I know of mining in the Llanarmon district, I have simply to say it is not true. I am very well pleased indeed with what I know of lead mining in this neighbourhood. And why? Because, so far, it is profitable to me, and I may say I have every reason to believe it will be very profitable. I believe that if every investor would take the same pains and use the same exertions in making his investments in lead mining as I have done so far, we should hear less of "mining sharks," and mining operations would be conducted more legitimately than they have been in many instances. For the satisfaction of your North Wales Correspondent I will tell him I am so well pleased with what I have in hand that I intend to go on, and to those of your readers who have money to invest in lead mining I would say go into the Llanarmon district, make your own enquiries, weigh the answers you may get carefully from the various properties you may look into, and, if you will enquire of people in authority on the properties, I think you will come away satisfied that the district is a good one for lead, and that all the properties at present worked are being conducted under the most able management and with the greatest regard to economy, which I am sure are matters of the first importance. With such properties as Bodidris, Lead Era, East Pant-du, West Minster, Bog Issa, Plass-du, Pant-du, Llandegla, Lady Ann, and Brynwyn, the investor would be sure to meet with properties and management that would give him satisfaction, and I am sure the more he knows of the Llanarmon lead mining district the less would he be troubled with "chagrined." I expect to be in Llanarmon again in the course of a week or so, and it will afford me the greatest pleasure indeed to be allowed space by you, Mr. Editor, to give you and your readers the information obtained by—AN ENQUIRER.

Nov. 17.
[For remainder of Original Correspondence, see this day's Journal]

THE CHEMICAL TRADE.—There is just this amount of truth in Lord Beaconsfield's recent sensational remark about the demand for chemicals—that in one particular branch of it a speculative spirit has arisen. The circular of Messrs. J. Berger Spence of Nov. 6 says:—"There has been considerable excitement in the chemical market, especially in the alkali branch, during last week; and manufacturers by the advance obtained during the past few weeks have become quite sanguine, and are now demanding very exalted rates both for the present and next year's delivery." But it is added, "These enhanced values have been brought about chiefly by the action of the dealers, as consumers as a body do not believe in the advance as real, and only a limited number are covering their forward requirements." If there were, as the Premier implied, an enormous increase of demand for consumption, so great as to be beyond the power of pro-

ducers to supply it, and if this had been true of the whole or even a great part of the chemical industry, the incident might have been valuable as an illustration of activity in other industries using these materials. But this is not the case, and the fact that prices of most descriptions of chemicals are very little higher than they were last Christmas, and some no higher at all, is enough to show that there has been no special renewal of activity in this branch of industry.

THE SCOTCH MINING SHARE MARKET—WEEKLY REPORT AND LIST OF PRICES.

During the past week the markets have been steady. The tendency of prices is favourable, owing to the greater activity reported in all the principal branches of manufacturing industry and the easier state of the money market. The improvement in trade, which was generally expected could only be slow and halting, on the contrary appears rather to be gaining strength, as there are evidences of the home and Continental and other foreign trades being better, exclusive of the hurricane of prosperity in progress in America. The fact that prices of shares are still greatly below the average of ordinary years renders it quite safe for people who can hold to buy freely.

In shares of coal and iron companies the alterations for the past week comprise advances of 3*t*. 15*s*. per share on Bolckow, Vaughan (A), 2*t*. 10*s*. on Ebbw Vale, 1*t*. 10*s*. on Glasgow, Port Washington (A), 1*t*. 5*s*. on Glasgow Port, 1*t*. 10*s*. on Capeladre, 4*s*. ; Scottish Australian, old and new, each 2*t*. 6*s*. ; Monkland, 1*s*. 6*d*. ; Omoa and Cleland, 1*s*. ; and Benhar, 6*d*. The market for these shares, though less excited, is more healthy, and prices tend upwards. The dullness in the shares of the Scotch concerns must be due to the wages difficulties; but if that was satisfactorily solved, a rise is imminent. The American demand for iron, which looked like giving way, is again recovering; while the attempts to increase production show the home demand is considered permanent, and the reports from all districts are favourable. Benhars have been steady, from 4*s*. to 4*t*. The Darlington Iron Company are adding considerably to the number of men employed, and blowing in more furnaces, on account of great orders coming in from India and America. The capital of the General Mining Association is to be reduced to 219,752*t*. The mining of the Vancouver Coal Company will be on Nov. 25. Steel Company of Canada 1*t*. shares continue to be offered. Andrew Knowles and Sons are at 7*s*. 1*d*. ; Bilbao, 2*t*. ; Bolckow, Vaughan (A), 7*s*. 1*d*. to 7*s*. 6*d*. ; ditto (stock), 1*t*. 12*s*. to 1*t*. 15*s*. ; ditto (preference), 19*s*. ; Cardiff and Swansea, 3*s*. to 4*s*. ; Charles Cammell and Co., 5*s*. per share ; Chillington, 8*s*. to 9*s*. ; Clyde Coal fell from 7*s*. to 6*s*., but are now rising again; Darlington Iron, 8*s*. per share ; Ebbw Vale, 9*s*. to 9*t*. ; Great Western (B), 6*s*. ; ditto (preference), 7*s*. ; Hamstead, 12*s*. per share ; John Brown and Co., 1*s*. 1*d*. ; John Bagnall and Sons, 2*s*. 6*d*. to 2*t*. 6*s*. ; Maribella, 4*s*. to 4*s*. 6*d*. ; Monkland, 5*s*. to 5*s*. ; ditto (preference), 5*s*. ; Mersey Steel, 5*s*. per share ; Muntz's Metal, 1*s*. ; Nant-y-Glo and Blaina (preference), 2*s*. 6*d*. to 2*t*. 6*s*. ; Newport Abercarn, 7*s*. ; Omoa and Cleland, 2*s*. to 2*s*. 6*d*. ; Park Gate, 5*s*. per share ; Peisall, 7*s*. 6*d*. ; Rhymney, 2*s*. ; South Wales, 7*s*. ; Scottish Australian, 4*s*. to 4*s*. 6*d*. ; Sandwell Park, 1*s*. 1*d*. ; Sheepbridge, 12*s*. per share ; Staveley (A), 2*s*. 6*d*. ; ditto (B), 7*s*. 6*d*. ; Staveley (B), 7*s*. 6*d*. ; Tregarde (D), 1*s*. 1*d*. ; Thorp's Gwawen Hall, 3*s*. to 4*s*. ; Tredegar (B), 2*s*. ; West Cumberland, 7*s*. 6*d*. ; Whitehaven Iron, 10*s*. to 10*t*.

In shares of foreign copper and lead concerns Tharsis have advanced 15*s*. per share, Capo and Panulillo each 1*t*. 6*s*. ; Rio Tinto (7 per cent.) and Tharsis (new) each 5*s*., and Canadian 6*d*., but Huntingdon are 1*s*. easier. The half-yearly drawing of Rio Tinto (7 per cent.) bonds is on Dec. 1. Cape higher, on satisfactory mine reports regarding the new shaft sinking. The rise in Panulillo shares is principally owing to improvement in the copper trade, and a belief that the company will make large profits; some are predicting that the recent rise in shares is nothing, and that in a few years they will be at 10*t*. Yorke Peninsula is also another good thing to buy, as their mine reports are satisfactory; the last ore return stated about 220 tons had been shipped, on hand 26*s*. tons of 14*s*. per cent. ore, 360 tons smalls of 5 per cent., and 1500 tons dredge ore of 5 per cent. Tharsis opened lower at 23*s*., but run up to 30, and are still very firm. Alamillos, 3*s*. ; Condes de Chil, 2*s*. 6*d*. ; Fortuna, 5*s*. ; Linares, 5*s*. ; New Quebrada, 6*s*. 3*d*. ; Rio Tinto 5 per cent., 8*s*. 1*d*. ; Yorke Peninsula, 5*s*. to 6*s*. 3*d*. ; ditto (preference), 1*s*. 3*d*. to 1*s*. 9*s*. 6*d*.

In shares of home mines there is no particular alteration to observe, but investors in sound mining companies shares at depressed prices have assured prospects of improvement. Glasgow Caradons are 6*d*. lower, as the next sale appears to be a very small one, and some explanation should have been given. It will be 160 tons, as compared with 180 tons last month, while the sales in November for some years back have been from 195 to 250 tons. Devon Consols are also lower, as some had expected they would have been able to resume paying dividends, but their half-yearly report shows the sales of copper amounted to 10,521*t*, and arsenic 660*t*, against which are put seven months' cost, 18,992*t*. In the past half-year, the report says, copper touched the lowest recorded—53*t*. for Chili bars—so that a rise in price will materially improve their position. The shares are steady at the late advanced prices. If this winter is to be a mild one the lead mines will make more profits than they were able to do last year on account of the frost. The Grogwinion Company is to sell 100 tons of lead on Nov. 25. Ashtonians are at 12*s*. 6*d*. ; Bedford United, 9*s*. ; Dolcoath, 53*s*. ; East Roman Gravels, 1*s*. ; East Caradon, 6*s*. ; East Van, 3*s*. 6*d*. ; East Chiverton, 5*s*. to 6*s*. ; East Crebore, 2*s*. to 2*s*. 6*d*. ; Frongoch, 6*s*. ; Great Laxey, 18*s*. ; Gwanton, 1*s*. 9*s*. ; Killifreth, 10*s*. to 12*s*. 6*d*. ; Leadhills, 7*s*. 6*d*. ; Marke Valley, 27*s*. 6*d*. ; Mondy Gorddu, 4*s*. ; Mwyndy, 4*s*. 6*d*. ; Red Rock, 1*s*. 6*d*. ; Rhoesmor, 6*s*. ; Roman Gravels, 11*s*. ; South Caradon, 57*s*. ; South Conduffrow, 14*s*. ; South Frances, 11*s*. to 12*s*. ; South Darren, 6*s*. to 8*s*. ; Tankerville, 5*s*. to 5*s*. 6*d*. ; Tinctor, 15*s*. ; United Van Consols and Glyn, 10*s*. ; Van, 22*s*. ; West Chiverton, 9*s*. ; West Pateley Bridge, 4*s*. ; West Seton, 52*s*. ; West Poldice, 20*s*. ; West Tolgus, 28*s*. ; West Killy, 35*s*. ; West Ashton, 4*s*. to 4*s*. 6*d*. ; West Bassett, 10*s*. ; Wheal Kitty, 6*s*. ; Wheal Peevor, 17*s*. ; Wheal Jane, 5*s*. ; Wheal Comford and Treavean, 5*s*. to 7*s*.

In shares of gold and silver mines business is quiet. Richmonds steady all the week, the run being \$43,000. Some business was done in Flagstaffs up to 37*s*. 6*d*., but they have relapsed. The Plumas Eureka is making a profit equal to keeping up the 20 per cent. dividend. Port Phillip profit for the month ended Sept. 10 was 540*t*. The mine reports from Tolima report it very rich, and at the meeting on Dec. 3, a dividend of 7*s*. 6*d*. per share will be declared. Argentine, 1*s*. 6*d*. ; Australasian, 5*s*. ; Chontales, 7*s</i*

situated at San Juan County, Colorado. The company's property consists in the ownership, with two or three exceptions, of all lodes crossing the line of the tunnel on its entire length, and covering an area averaging 750 ft. on either side of the line, over 40 of which are of unparalleled richness, together with several outlaying mines, and a placer claim of 20 acres at one entrance of the tunnel. The mountain is about 1000 ft. high from the surrounding valleys, and about 11,800 ft. above the sea-level, an altitude at which the richest silver mines are generally found—such at Potosi and others. It is believed this mountain is the focal point at which centres and crosses the great mother veins of this district of immense mineral wealth. Indeed, one vein of the unprecedented width of 140 ft., has been plainly traced. The scheme is to drive a tunnel at a surface depth of 200 to over 1300 ft., and of a total length of about 7000 ft., through the very heart of the mineral bearing centre, so that nearly 40 mines will be developed. It is thus evident that the enterprise is one of the best ever yet brought to the notice of capitalists. It is said that not even the barren country rock of the mountain yields less than 1 oz. to the ton, which indicates the extraordinary richness of the mountain. Capital will only be issued to an extent sufficient to actually develop the paying value of the mine, as it is expected at the work progresses that sufficient ore will be obtained to not only prosecute its labours, but also to pay dividends very soon. The par value of the shares is \$10, and it is said they will be worth double that soon.

Capital.	Dividends.	Description of shares.	Last price.
Per Paid	Rate per cent.	per annum.	Previous. Last.
£ 10 up.	£ 5	£ 5	Arlington Coal (Limited)
10	4	nil	Benhar Coal (Limited)
100	25s.	10	Bolckow, Vaughan, and Co. (Lim.) A
10	10	10	Cairnthal Gas Coal (Limited)
10	4s.	April, 1876.	Chillington Iron (Limited)
10	—	—	Clyde Coal (Limited)
23	20	10s.	Ebb Vale Steel, Iron, and Coal (Lim.)
10	5	nil	Fife Coal (Limited)
10	—	—	Glas. Port Washington Iron & Coal (L) B
10	—	—	Ditto, A
10	—	—	Lochore and Capelstrane (Limited)
10	—	—	Marbella Iron Ore (Limited)
10	—	—	Monkland Iron and Coal (Limited)
100	—	—	Ditto, Guaranteed Preference
6	6	nil	Nant-y-Glo & Blaina Ironworks pref. (L)
1	1	15	Omora & Cleadon Iron & Coal (L & Red.)
1	10s.	15	Ditto, New
Stock. 100	—	nil	Shotts Iron
10	8	6	Steel Company of Scotland (Lim)

COPPER, SULPHUR, TIN.			
4	4	—	Canadian Copper and Sulphur (Lim.)
10	7	72s 6d.	Cape Copper (Limited)
1	1	2½	Glasgow Cardon Copper Mining (Lim.)
1	15s.	2½	Ditto, New
10	9¾	nil	Huntington Copper and Sulphur (Lim.)
4	4	—	Panulicille Copper (Limited)
10	10	nil	Rio Tinto (Limited)
20	20	7	Ditto, 7 per cent. Mortgage Bonds
100	100	5	5 p. c. Mor. Deb. (Sp. Con. Bds.)
10	10	17½	Tharsis Copper and Sulphur (Limited)
7	7	17½	Ditto, New
1	1	—	Yorke Peninsula Mining (Limited)
1	1	—	Ditto, 15 per cent. Guaranteed Pref.

GOLD, SILVER.

1	1	—	Australasian Mines Investment (Lim.)
5	5	7s. 6d.	Richmond Mining (Limited)
OIL.			
10	8½	—	Broxburn Oil (Limited)
10	7	5	Dalmeny Oil (Limited)
1	15	20	Oakbank Oil (Limited)
1	5s.	15	Ditto
10	10	2	Uphall Mineral Oil (Limited) A
10	10	—	Ditto, B Deferred
10	8½	17½	Young's Paraffin Light & Mineral Oil (L)

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The agent's (Capt. J. Richards) report is herewith annexed, showing the quantity of copper ores and mundic in reserve:-

Copper ores.....Tons 27,299 | Arsenical mundic ...Tons 22,000

Which shows an increase on the quantity in reserve 12 months ago, when there was

Copper ores.....Tons 26,465 | Arsenical mundic ...Tons 21,000

A careful perusal by the shareholders of this report will clearly show the vigorous prosecution these mines are now receiving by an increased number of hands, with a view to making important discoveries of ore ground. The attention of shareholders likewise is specially directed to operations being resumed in the southern portions of the mine, which is in future to be known as "Watson's." Many years ago this part of the mines produced large quantities of copper ores and mundic, but at that time mundic was of little value, and as other portions of these extensive run of mines were so much richer and more profitable, this southern portion was suspended. Seeing the great quantities of ores the new south lode has since then produced, and still continues to do, it is anticipated that Watson's portion of the property may be very vigorously developed turn out equally as productive. In the *resumé* of Capt. Richard's report he states that he has "the satisfaction of observing that our present and future prospects are most encouraging."

With a continued rise in the price of copper and arsenic, which the directors trust and believe will be the case, especially next year, they hope to be enabled to provide for the large outlay necessary for the purchase of rock-boring machinery and various other materials in connection therewith, and to resume the payment of dividends.

By order of the Board of Directors,

PETER WATSON, Chairman and Managing Director.

LEVANT.—Captains Henry Trezise and James Thomas, in their report, say—"We are driving the 18 ends by 58 men and 11 boys, and we have 17 pitches working by 35 men and 7 boys, at tributes varying from 9s. to 17s. in 17. Total men and boys on tutwork and tribute, 158 men and 26 boys. We have raised during the last 16 weeks near 90 tons of tin and 820*t*, worth of copper. The price of tin and copper having advanced considerably since the last account, we are of opinion that some steps should be taken to get a rock-drill to work in the 278 fm. level in order to expedite the work of driving towards the north and south lodes. The north lode has been and still is the most productive lode in the mine. We have also much pleasure in calling the attention of the adventurers to the piece of ground now idle in the eastern part of the mine, which we believe to be the best piece of unworked ground in this neighbourhood.

FOREIGN MINING AND METALLURGY.

Belgian industrials begin to dignify with the name of a revival the prolonged improvement which has certainly occurred in the Belgian iron trade. Whether the term "revival" is strictly speaking a correct one matters appear to justify it to some extent. Thus at Liège iron is now fetching 5*l.* 8*s.* to 5*l.* 12*s.* per ton which a few months since was disposed of upon just any terms which could be obtained. Steel rails and plates are also the subject of numerous transactions. The Lion Belge Rolling Mills at Couillet have just been disposed of. The purchaser was M. Silly-Pauwells, of Brussels, who agreed to pay 6280*t*. for them.

The improvement in the Belgian coal trade has become unmistakably more decided. There are complaints, however, of a scarcity of rolling-stock upon the Belgian State Railways. The conveyance of beetroot appears to be employing a great number of trucks at present, and colliery proprietors are suffering in consequence. The glass trade has contributed in no slight degree to the increase in the demand for coal. Belgian coalowners have noted with pleasure the determination which Westphalian colliery proprietors have displayed to advance their rates, as they think that such a policy will bring them back a good deal of business which formerly went into the hands of the Germans. The iron trade makes many proposals to Belgian colliery proprietors to conclude contracts, but the latter show at present a disposition to reject all the propositions made to them. A new mechanical washing apparatus recently installed at the Hasard Collieries, near Liège, is doing wonderfully well; deliveries of washed coal now proceeding at the rate of 250 tons per day. Official approval has just been given to plans for the enlargement and deepening of a canal from Charleroi to Brussels.

The French Mineral Industry Society, Northern District, held a meeting on Nov. 6, at Douai. The Dahlbusch Collieries Company has announced an advance of 7*d.* per ton. An advance in the price of coal appears likely to become general in the Westphalian Basin.

Merchants' iron and special iron have been in active demand at St. Dizier during the last ten days. The same may be said of machine iron. The forges are, in fact, generally making an advance in their quotations. The foundries are also well off for orders; but in this department the rise has not made itself felt, and prices have ruled low. In the Nord No. 2 first-class iron has made 6*l.* 16*s.* per ton, with a scale of 8*s.* per ton between classes. Other iron has been tending upwards in the same district; plates, for instance, have advanced 4*s.* per ton. In the Loire-et-Rhône business is moving on well, and we must go back for several years to find such continued activity. Quotations have not yet experienced, however, any sensible amelioration; they show great firmness, but no advance. Ten steamers required by the French General Transatlantic Company for a line between Port-Vendres and Algeria are to be built on the banks of the Tyne and the Clyde. The average price to be paid for these steamers is 45,590*t.* while the Société des Forges et Chantiers de la Méditerranée required 56,000*t.* per steamer.

IMPROVED TELEGRAPH WIRE.—To produce wire and other forms of iron of high and uniform quality, of high electrical conductivity, and capable of withstanding a high tensional and torsional strain, Mr. J. COOKE, of Rotherham, has patented an invention which consists in reducing the quantity of carbon, silicon sulphur, and manganese existing in common metal to the relative proportions in which they exist in best iron. He first produces by ordinary means and in ordinary apparatus a metal containing—iron, 99.753; carbon, 0.450; silicon, 0.077; sulphur, 0.070; and manganese, 0.890. This metal or metallic alloy he cuts into small pieces and places in a furnace and surrounds it with charcoal and subjects it to one or more currents of atmospheric air, by which means it is melted, the action of the air and the charcoal upon the metal or metallic alloy being continued until the elements in excess are reduced to their proper proportions to ensure the iron being of the quality specified. The mass of fused iron is balled up, and forged and manipulated in the ordinary way.

WELDED TUBES.—A furnace used in the manufacture of welded iron and steel tubes as ordinarily constructed consists essentially of an arched chamber of a length exceeding that of the skelp from which the welded iron and steel tubes are to be made. A series of four or other number of fire-grates extend from end to end of the said chamber on one side, and at the opposite side is a series of small horizontal flues by which the flame and products of combustion pass into a large common flue parallel with the arched chamber. A wall constituting the back of the ash pits of the grates and bridge of the furnace runs from end to end of the arched chamber nearly under the middle of the arch. The level of the bottom of that part of the arched chamber separated by the bridge from the fire-grates is somewhat higher than that of the fire-grates, and constitutes the bed of the furnace or a heating chamber in which the skelp to be made into a tube is raised to a welding heat. This heating chamber has an opening at each end for the introduction and removal of the skelp. The several openings in the furnace are provided with doors or dampers for closing them when required. The waste heat from the furnace is usually utilised by being made to heat a steam-boiler. In constructing the said furnaces according to the invention of Mr. C. E. SMITH, of Wednesbury, he converts the common flue of the furnace into a preliminary heating chamber, in which the iron or steel skelp to be made into a welded tube undergoes a preliminary heating before it is introduced into the bed of the furnace. He effects this by making an opening at each end of the common flue, the said openings being provided with doors or dampers. Where it is convenient to do so he prefers to make the bed of the said common flue on the same level, or nearly so, as that of the bed of the principal heating chamber. The heated air and products of combustion in passing from the preliminary heating chamber into which the common flue has been converted may be utilised for heating a steam-boiler, or may be utilised for other purposes. Instead of conducting the heated air and products of combustion from the preliminary heating chamber to the steam-boiler or the chimney stack or elsewhere by one flue, he prefers, where it is convenient to do so, to conduct them by two or more small flues in place of one larger one, and to provide the said small flues with dampers. By these means the heat of the preliminary heating chamber can be made more uniform in all parts than when only one large exit flue is employed. By the use of furnaces

constructed according to his invention great economy is effected in the manufacture of welded iron and steel tubes. By the preliminary heating of the skelp before its introduction into the principal heating chamber it is raised to the required welding heat in the principal heating chamber in about one-half the time ordinarily required; the heat of the principal heating chamber is not reduced by the introduction of cold skelp, and two or more skelps are under treatment at the same time, one or more skelps being raised to a red heat in the preliminary heating chamber while one is being raised to a welding heat in the principal heating chamber. There is thus effected great economy both in time and fuel.

FOREIGN MINES.

ST. JOHN DEL REY MINING COMPANY (Limited).—Advices received 30th October, 1879, ex Neva (s.), dated Morro Velho, Oct. 2:

GOLD EXTRACTED TO DATE.—The produce for the second division of September, a period of eight days, amounts to 9253*t*. oits.=1066722 ozs. troy. It has been derived as follows:

	Oits.	Tons.	Oits.	Tons.
General mineral	6264 <i>t</i> 3	965	=	6491
Mineral free from killas	2508 <i>t</i> 0	280	=	8957
Re-treatment (Arrastras Morro Velho)...	8772 <i>t</i> 3	1245	=	7046
ditto (Praia)	237 <i>t</i> 5	—	=	0191
	243 <i>t</i> 2	—	=	0185
Total	9253 <i>t</i> 0	1245	=	7432

MINE.—Return of duty for 13 working days:

Mineral raised from the mine.....	2563 "
Mineral quarried per borer per diem.....	257 "
Average number of borers daily.....	7661 "
Average number of natives daily.....	16769 "

MEASUREMENT FOR THE MONTH OF SEPTEMBER:

SINKING.—Sump-shaft vertically.....	6 ft. 0 in.
Width of forebreast.....	31 7
Pure mineral contents.....	18 5

STOPING.—First stopes west from sump.....

Fair average quality.....	19 6
Third stope, 277 " D"	6 "
Pure mineral contents	6 6

DRIVING.—Temporarily suspended owing to want of force.....

Total rainfall for September.....

Advices received Nov. 14, ex Trent (s.), dated Morro Velho, Oct. 18:

GENERAL OPERATIONS.—The gold return and average yield per ton differs but little from that for the month of August.

Notwithstanding an unusual amount of sickness which prevails, the work in the mine and at the surface has been satisfactorily performed. The average attendance of native borers has been a trifle higher.

GOLD PRODUCE FOR THE MONTH OF SEPTEMBER.—The gold extracted amounts to £34,285*t* 7 oits.=3950-3813 ozs. troy. It has been derived as follows:

	Oits.	Tons.	Oits.	Tons.
General mineral	23,858 <i>t</i> 4	3913	=	6097
Mineral free from killas	8,611 <i>t</i> 0	984	=	8751
Re-treatment	32,469 <i>t</i> 4	4897	=	6630
	1,798 <i>t</i> 3	—	=	0366
Total	34,285 <i>t</i> 7	4897	=	7996

REDUCTION DEPARTMENT—PRAIA.—The experimental process of stamping reduces sand was carried on throughout the entire month with still better results:

August yield.....	0933 oits. per ton
September yield.....	1850

equal to nearly 46 per cent. of the assay contents. This is the highest recovery ever obtained from re-treatment. One side of the Hockin stamps is now in course of alteration to admit of a larger scale of treatment.

A furnace for sand calcination is also being erected.

CONSTRUCTION WORKS.—The completion of the eastern side of the New Cotesworth Mill has been delayed by want of timber, of which only a small quantity has been received, owing to the parochial states of the pastures. Extra premiums have been offered, but the owners positively decline to deliver until the rains set in. The same reason applies to the transport of the permanent machinery, the greater part of which is still at Barbacena.

WATER SUPPLY.—The 200 cubic feet now required for the working of the Bahu Mine wagon hauling wheel will in a few days become available for the principal hauling and pumping wheels. The spalling-floor turbine has been adapted for this work without any detriment to its present duty. This will prove an important addition to the primary power much needed at this season of the year.

COST AND PROFIT.

Produce for September	34,224 <i>t</i> 6 oits.
Less loss on melting.....	158
	34,066 <i>t</i> 0
Add recovered	411
Cost	34,107 <i>t</i> 1, at 7s. 9d. per oit. = £13,216 11 1
	7,580 5 1 1

Profit

£5,656 5 0 0%

The month's profit has been unfavourably influenced by an increase in the European and native pay, together with a rise of one penny per milreis in the rate of exchange.

MINE.

Mineral raised from the mine.....	5072 tons.
Mineral quarried per borer per diem	270
Average number of borers daily.....	7223 "
Average number of natives daily.....	15715

EASTERN SECTION—SUMP AND STOPIES 278 "C" & "D".—The contraction of lode confined to this part of the mine is less defined. East of the indent (Sump section) the width of the pure mineral on the south wall side has slightly increased, and at stopes 278, "C" and "D," similar indications of a reduced contraction have been met with.

The sinking rate of the sump continues limited, owing to the large area embraced, the work of which has been simultaneously carried on with the lowering of the inclined stope west of sump.

RESERVES—SECTIONS 237 "A" & "B".—The extraction of mineral has been on an increased scale. The lengthening and re-arrangement of the shoots, referred to in last month's report, have been completed.

REDUCING ALKALINE AND EARTHY SULPHATES.

The principle of the process invented by Mr. E. BONG, of Paris, is to reduce the alkaline sulphates—the sulphates of baryta, lime, and strontia—by sulphuretted hydrogen, and to produce this sulphuretted hydrogen by the decomposition in any suitable manner by means of carbonic acid from the sulphur obtained in the process. The quantity of sulphuretted hydrogen obtained being insufficient to completely reduce the sulphate there should be added a certain quantity of reducing gases obtained from a gas generator, and containing as much as possible of the hydrogen, so as not to introduce too great a quantity of inert gases into the sulphuretted hydrogen. These reducing gases may be sent into the oven or apparatus either at the same time as the carbonic acid or at any other suitable time. The reducing gases, moreover, by their oxidation will produce the carbonic acid, which decomposes a portion of the sulphur, and engenders a certain quantity of carbonate.

When it is only required to treat sulphates the reducing substance may be carbon, such as anthracite or coke, which may be mixed with the sulphate, and made up into bricks. In such cases the combustible will be burned by means of the oxygen contained in the sulphates, thereby producing heat exactly at the place where it is required; moreover, the sulphurous gas obtained is not diluted with a quantity of atmospheric nitrogen, which would uselessly take up or absorb the heat.

If it be required to extract from the sulphates the sulphur and not the sulphurous acid it would only be necessary to carry out (from the apparatus at convenient points) the sulphuretted hydrogen and the sulphurous acid, and to mix them in a heated state. By extracting the gases at certain parts of the apparatus a large quantity of sulphur completely formed may be collected. By suitably regulating the temperature in the chambers a large quantity of sulphur in a free state may be collected from the final solid product.

If it be desired simply to produce sulphur the addition of carbonic acid must be avoided, and foreign reducing agents employed exclusively. For treating sulphates they are first mixed with foreign substances, and then heated by means of any waste heat, or by heat obtained from furnaces employed for the purpose. The sulphuretted hydrogen and reducing gases which act upon them oxidise with the disengagement of heat, which keeps up the required temperature. The sulphates are thus converted into sulphurites, and even into carbonates; the carbonic acid which acts on the sulphurites is then absorbed, and disengages sulphuretted hydrogen, and for this reason the gases which will finally act will become very reducing. As regards the chlorides, they may also be converted into carbonates by passing through the intermediate state of sulphate, which is effected by any suitable process. By making use of the process for producing the alkaline sulphates (by the action of corresponding chlorides upon the sulphates of alumina or magnesia) there will be left after wasting a residue of alumina or magnesia.

COLLECTING WASTE FUMES OF LEAD SMELTING FURNACES.

In the process of smelting lead ores large amounts of volatile fumes necessarily escape and are lost. Moreover these escaping fumes are found to be injurious to the surrounding land. Various attempts have been therefore made by passing these escaping fumes through horizontal or ascending flues of great length to cause the said fumes to be deposited, but these attempts have been attended with great expense, and only partially successful. By passing the escaping fumes from a lead ore smelting furnace through a series of cooling tubes and then into a series of bags the said escaping fumes can be thoroughly and effectually strained out and collected, while the attachment of the cooling tubes and collecting bags does not interfere with the smelting operations. A cooling and collecting apparatus constructed according to the invention of Mr. G. T. LEWIS, of Philadelphia, may be used in combination with either of the ordinary lead ore smelting or reducing furnaces, such as the Scotch eye furnace, the reverberatory smelting furnace, or the cupola smelting furnace, or with the lead refining furnace. In carrying the invention into practice he provides a descending flue which leads from the chimney or shaft of the furnace to a series of vertical cooling tubes, so arranged that the fumes are forced to ascend and descend successively as they pass along through the said tubes. These tubes are made of sheet metal, as thin metal rapidly throws off the heat of the contents and cools the fumes. The said tube should be about 2 ft. in diameter, and the series should furnish about 350 ft. of aggregate length. They can be cleaned out by openings with moveable covers made in the lower part of the flue if necessary, but the deposit will be very small. The last tube of the series of tubes communicates with the eye of a fan, and the fumes are drawn by this fan through the said series of cooling tubes and discharged into a tube which connects with a horizontal tube. From the latter are suspended a series of strainers or bags composed of textile fabric, through the meshes of which the gases escape, leaving the solid material or fume proper within the bag or strainer. Instead of a textile fabric any similar straining material may be used.

It is found in practice that the fumes collected are composed of sulphate, sulphite, carbonate, and oxide of lead when ordinary galena ore is smelted; when carbonate lead ores are smelted the fumes collected will be found to consist of oxide and carbonate of lead mainly. If the ores smelted are the argentiferous ores of lead then the fumes so collected will contain in addition to the above-mentioned salts of lead also the corresponding salts of silver. The fumes when collected in the said bags are removed therefrom by shaking, and may be either used as a grey pigment direct, or after purification as a whiter pigment, or they may be returned to the furnace and reworked for the metals which they contain. Mr. Lewis is aware that it has been heretofore attempted to collect the waste fumes of lead smelting furnaces in long flues, but in such a manner as to be expensive and unsatisfactory. He is also aware that a patent has been granted for blowing pulverised argentiferous ores of lead into a furnace, and then passing the fumes through a showering chamber to throw down the silver, and afterwards collect the lead fumes in bags, but the water employed to wash the fumes absorbed the sulphuric acid and the vapour destroyed the bags. He is also aware that textile fabrics have been employed with compound reducing and oxidising zinc furnaces, and also with compound reducing and oxidising lead furnaces, but no one has heretofore combined a series of cooling tubes and collecting textile fabric with the lead smelting and refining furnaces, so as to prevent the waste incident to the processes of melting or refining. But his present improvements comprise the direct combination with the chimney or shaft of a lead or smelting furnace or lead refining furnace of a series of metallic cooling tubes and a series of bags of textile fabric, or their equivalent.

CASTING STEEL.—An improved process of casting steel ingots so as to ensure their being of a more perfect dense and homogeneous character throughout, and to prevent the piping caused by shrinkage in cooling, has been invented by Mr. W. A. SWEET, of Syracuse, New York. The process which he employs for melting and pouring the fluid steel into the ingot mould is somewhat similar to that heretofore practised, but instead of leaving the steel to shrink from the centre in cooling, by which a piping more or less deep is formed, and a serious imperfection in the cast steel ingot thus produced. He obviates this defect by heaping over the top of the mould a sufficient quantity of ignited charcoal or other carbonaceous combustible, or any efficient slag or flux in a highly heated state that will properly keep up the temperature so as to cause the melted metal to flow in and fill up the centre as the shrinkage takes place in cooling. In this manner he makes the ingot solid and homogeneous throughout, excepting a very small space at the top, thus increasing the quality and quantity of the ingot, and reducing the loss occasioned by defective casting in the methods heretofore employed. The best results may be attained by the use of finely powdered charcoal heated intensely, but other substances may be substituted and good results thereby obtained—that is to say, he may use any suitable kinds of fuel, fluxes, or analogous materials, highly heated, which will prevent oxidation, and which are well known to metallurgists, the purpose

being to keep the metal sufficiently fluid to fill up the centre and prevent piping. It may be found desirable to place a small quantity of highly heated carbonaceous material in the bottom of the mould and pour the melted steel through it, and after the carbon is placed upon the moulds over the molten steel therein, it is desirable to pour a small quantity of melted steel through as a finish.

SALES OF COPPER ORES.

COPPER ORES SOLD AT THE CORNWALL TICKETINGS, FOR THE QUARTER ENDED SEPTEMBER, 1879.

Mines.	Total	Amount.
South Cadron	1450	£2183 12 0
Mallard	1691	5188 15 6
Devon Great Consol	2386	4722 4 6
West Tiverton	780	4199 15 6
Gumfolds (Old Consol)	674	2276 19 0
Marie Valley	776	2121 3 6
Glasgow Consol	540	1988 2 0
West Saxon	325	1289 16 0
East Pool	6112	1237 14 6
Levant	1120	636 9 0
Bedford United	142	528 13 0
Wheat Croker	1632	519 11 0
Whit Owles	117	322 3 6
Botallack	55	240 12 0
North Treskerry	64	221 16 0
Phoenix	50	208 15 0
Hington Down	60	112 10 0
East Caradon	15	111 0 0
Pope's Ore	27	110 14 6
North Levant	15	93 7 6
Gawton	54	85 15 6
Carn Brea	32	80 18 0
Wheat Basset	21	63 0 0
West Bassett	23	55 17 6
South Crofty	20	49 0 0
Whale Agar	14	47 19 0
Penstruthal	4	31 2 0
South Tolcarne	5	26 17 6
Rule's Precipitate	2	22 6 0
Richards's Ore	4	15 10 0

COMPANIES BY WHOM THE ORES WERE PURCHASED.

Tons.	Amount.
2,597	£ 7,637 12 4
2,151	8,618 8 11
1,804	5,453 3 0
2,206	6,839 3 2
1,404	3,938 2 8
73	287 17 11
Total	10,235 £32,774 8 0

COPPER ORES SOLD AT THE SWANSEA TICKETINGS, FOR THE QUARTER ENDED SEPTEMBER, 1879.

Mines.	BRITISH.	Tons.	Amount.
Berehaven	610	£ 3,325 8 6	
Cambrian	50	491 5 0	
Tigrony	18	348 18 0	
Bampfylde	4	22 10 0	
Total	682	£ 4,188 1 6	

COLONIAL.	Tons.	Amount.
Betts Cove	4807	£22,775 4 6
Union	1270	6,189 4 6
Australian	36	729 18 0
Total	6113	£29,694 7 0

FOREIGN.	Tons.	Amount.
Caveira	930	£ 4,330 19 0
Bogalho	155	2,163 8 6
Virneberg	197	1,333 8 0
Sobral	62	531 13 0
Spanish	106	336 11 0
Telhadella	28	185 4 0
Mostardreiro	11	104 10 0
La Borbolla	46	78 14 0
Total	1535	£ 9,064 7 6

RECAPITULATION.	Tons.	Amount.
British	682	£ 4,188 1 6
Colonial	6113	£29,694 7 0
Foreign	1535	9,064 7 0
Sundries	350	1,880 15 6
Total	8680	£44,807 11 6

COMPANIES BY WHOM THE ORES WERE PURCHASED.

Tons.	Amount.
1,267	£ 6,024 6 0
722	3,149 3 6
41	293 5 6
1,045	5,263 13 0
2,433	14,796 4 6
732	2,909 9 3
658	3,516 12 3
943	3,351 4 3
839	5,503 13 3
Total	8680 £44,807 11 6

NATIVE BRITISH SILVER AND GOLD.—The quantity of silver obtained in 1878 from British mines was 397,471 ozs., and most of the precious metal was found in combination with lead. The total value of the silver thus obtained in the year in question was estimated at 88,2961. 19s. 6d. In the same year the gold found in British mines weighed 702 ozs. 16 dwt. 8 grs., and was estimated to be of the value of 23481. 15s. 2d. Nearly the whole of this British gold—a fraction over 697 ozs.—was procured in Wales, in the Clogau Mine in Merionethshire. The balance of 5 ozs. and a fraction was found near Wicklow, in Ireland, in 86 lbs. of ore. Of silver ore, about 94 tons were found in Cornwall in the Huel, Prince of Wales, and Redmoor Mines, which yielded silver to the value of 59941. 11s. 10d. The richest argentiferous lead ores are found in the Isle of Man, where the 3920 tons of lead ore procured from the nine Nanx mines yielded in 1878 as much as 110,496 ozs. of pure silver. In Wales, which possessed 97 lead mines in 11 counties, the silver won in 1878 weighed 148,376 ozs. England, with 266 lead mines in 10 counties, produced 118,629 ozs. of pure silver in the same year, while 14,320 ozs. were got from the lead ores produced in Scotland, and 5650 ozs. from those of Ireland. The quantity of British silver produced in the year was rather more than 11 tons, and the value was nearly 8000l. a ton.

PRISMATIC POWDER.—The use of large calibre guns has necessitated the use of special powder, and it is now found that advantages result from giving the powder grains a definite form. In the English service the 38-ton guns have been usually charged with P. 2 (pebble 2) powder, having cubes $\frac{1}{4}$ in. square on each face, while in the 81-ton gun the cube faces were $\frac{1}{2}$ to 2 in. square. All the pebble powders are made by cutting the press cake into cubical lumps by a machine, and the sharp edges and angles of these lumps are removed by the process of glazing them with plumbago in a revolving barrel. Capt. Rodman, United States Army, suggested prismatic powder—large grained and hard pressed—for guns of large calibre, to avoid excessive strain. Owing to difficulty of preparing the prisms American artillerists retained large-grained powder similar to the English, but in 1866 Prof. Wishngatson set up presses and made Rodman's prismatic powder at Okte, near St. Petersburg; it was tried by the Russian Government, and under direction of Gen. Majefshii—in November, 1867—at Krupp's factory in 9, 10, and 11-in. guns just made there, and Krupp has since recommended it in all cases where his large guns are used. The Armstrong 9-in. muzzle loader, with ordinary large-grained powder, proved superior to the Krupp 24-centimetre gun similarly loaded, and was more accurate; but with prismatic powder the accuracy with Krupp's was greatly increased, though no more pressure was produced with 24 kilos. of prismatic than 22½ kilos. of ordinary powder. The Prussians, therefore, adopted the prismatic powder, but it was soon found to afford very unequal results, and it was ultimately concluded that the ballistic properties of the powder were dependent on certain preliminary steps of the manufacture. In Germany it is thought that increase in size of individual pellets causes greater strain on the gun, but English experience proves the contrary to be the case. The general inference to be drawn from the experiments is that the best results are obtained by adapting the powder to the gun, one form of

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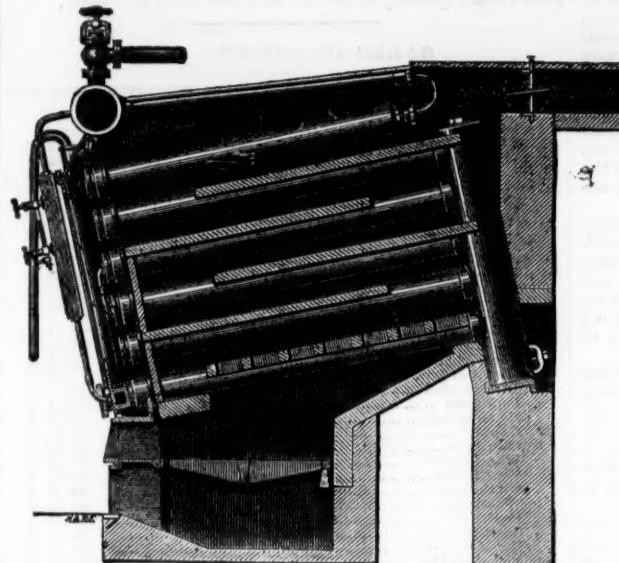
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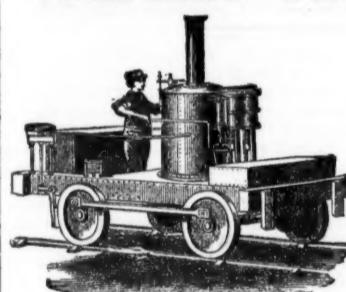
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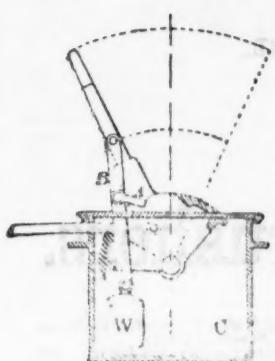
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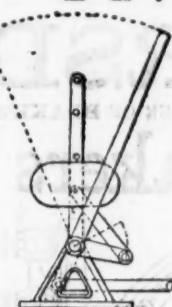
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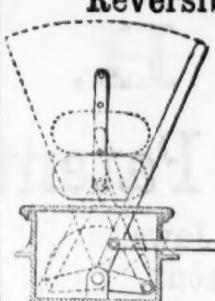
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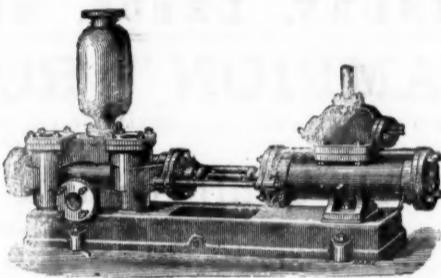
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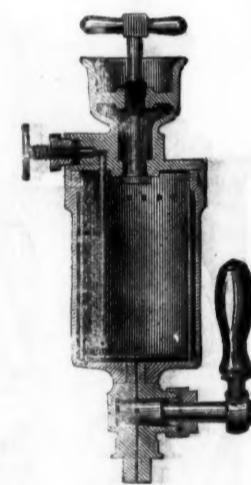
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4	4	18	5,040	25
6	4	18	4,280	33
6	6	18	9,660	41
8	6	18	7,920	50
10	8	18	12,060	80

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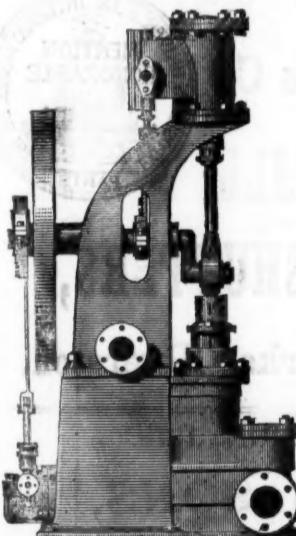


STEAM PUMPS,

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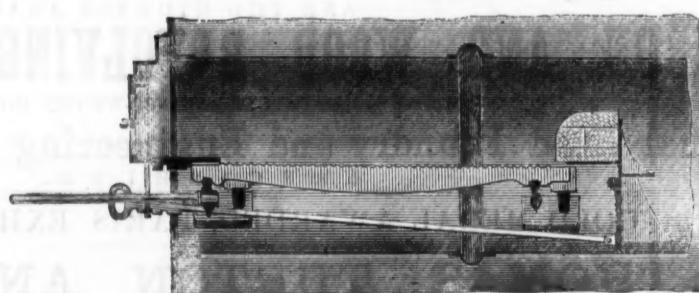


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3	7	25 0
4	10	30 0
5	20	37 6
6	30	47 6
7	50	60 0
8	70	85 0
9	100	110 0
10	200	

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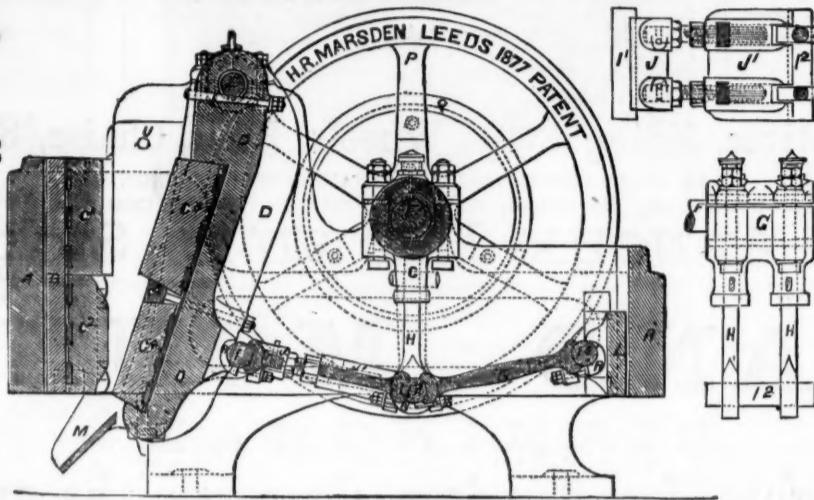
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70

PRIZE MEDALS.



READ THIS—

Wharhole Lime Works, Maryport, Whitehaven,
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H. R. MARSDEN, Esq., Soho Foundry, Meadow-lane, Leeds.
DEAR SIR.—The machine I have in use is one of the large size, 24 in. by 12 in. The quantity we are breaking daily with this one machine is 260 tons, the jaw being set to break to a size of 2½ in. We have, however, frequently broken over 300 tons per day of ten hours, and on several occasions over 360 tons during the same period. The stone we break is the blue mountain limestone, and is used as a flux in the various ironworks in this district. We have now had this machine in daily use for over two years without repairs of any kind, and have never had occasion to complain of any inconvenience in using the machine. I hope the one you are now making for me may do its work equally well. The cost—INCLUDING ENGINE-POWER, COALS, ENGINE-MAN, FEEDING, and all EXPENSES OF EVERY KIND—is just 3d. per ton. Should any of your friends feel desirous of seeing one of your machines at work, I shall have much pleasure in showing the one alluded to.

I am, dear Sir, yours very truly,

WILLIAM MILLER.

AND THIS—

Wharhole Lime Works, Aspatria, Cumberland,
July 11th, 1878.

H. R. MARSDEN, Esq., Soho Foundry, Leeds.
DEAR SIR.—We are in receipt of your letter of 4th inst. I may just state that the stone breaker above named has been under my personal superintendence since its erection, and I have no hesitation in saying that it is as good now as it was five years ago.

I am, dear Sir, yours faithfully,

FRANCIS GOULD.

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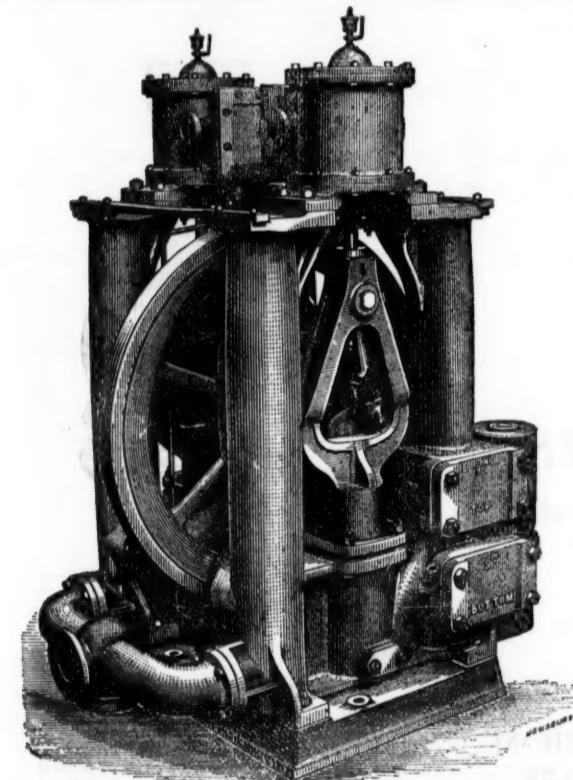
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